Report of the Regional Workshop on Modeling Structural Adjustment and Income Distribution: CGE Framework

Dhaka, Bangladesh
16-17 May 1999

CIRDAP

Centre on Integrated Rural Development for Asia and the Pacific

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Report on Regional Workshop on Modeling Structural Adjustment and Income Distribution: CGE Framework

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Contents

Regional Workshop on Modeling Structural Adjustment and Income Distribution: CGE Framework

As a follow-up of the decision of the third MIMAP annual meeting in Kathmandu in November 1998, a Regional Workshop on 'Modeling Structural Adjustment and Income Distribution: CGE Framework' was held at CIRDAP HQs, Dhaka, Bangladesh from 16-17 May 1999. The Workshop was organised by the Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) for MIMAP modelers and was attended by participants from five countries: Bangladesh, India, Nepal, Pakistan and Philippines. Professor John Whalley, University of Western Ontario, Canada, Professor Bernard Decaluwe, University of Laval, Canada and Dr. Paul Dorosh of International Food Policy Research Institute (IFPRI), Dhaka were present as resource persons. The list of participants is attached as Annex-I. The programme of the workshop is given at Annex-II.

1. Summary of Workshop Proceedings

In addition to the modeling framework, several general issues were identified for discussion in order to provide the background to the modeling efforts. These included:

- Nature and extent of linkages of the modeling framework with other components of the MIMAP project;
- Contribution of the MIMAP model vis-à-vis other modeling efforts in the country in addressing macroeconomic reforms and distribution linkages;
- Major policy conclusions and linkages between specific policies and poverty outcomes emerging from simulations with MIMAP models;
- Extent of impact in terms of use of model related results in policy making and project/programme formulation and country response to Bank/Fund policies;
- Nature of linkages established with national and international agencies in developing and sustaining capacity building under the MIMAP project;
- Availability of technical capability and the required database to perform model related work;
- Relevance of increasing cross-country collaboration in MIMAP exercise and identification of common thematic priorities;

- Inclusion of time-bound work plan to be followed to provide a general direction of the modeling exercise and nature of future demands;

- Importance of creating a well-trained modeling team through designing effective training programmes for junior modeling staff; and

- Ideas about effective communication links between country modeling groups and IDRC and the desired role of the technical advisory group.

1.1 Country Presentations

The highlights of the country presentations and discussions are as follows:

Bangladesh

Several areas were highlighted in the Bangladesh paper where progress had been made in the CGE framework since the Kathmandu meeting in November 1998. These included: adjustments in the model structure to incorporate suggestions received from the Kathmandu meeting; re-construction of the database of the model including a new SAM for 1993/94 to incorporate the newly constructed input-output table by the Bangladesh Planning Commission; inclusion of female headed households as a separate socioeconomic group within the structure to examine relevant gender issues; and simulation results to analyse distributional implications of tariff changes after successful calibration of the model.

The paper also provided an overview of the proposed future extension of the modeling framework to analyse MIMAP concerns. The work plan includes several activities e.g., construction of flow-of-funds and financial SAM for analysis of financial sector in the CGE model; dynamic extension of the CGE model; construction of a macroeconometric model to supplement the CGE framework; empirical estimation of elasticity and other parameter values, market structure variables and benefit pattern of public expenditure; explicit treatment of microcredit within the model structure; and analysis of gender aspects.

The discussion during the workshop pointed out several areas where the modelers could work further to analyse possible implications e.g. robustness of model results to elasticity parameters (e.g. different labour categories and capital); more explicit treatment of external closure rules (e.g. capital inflows); alternative mechanism of financing the budget deficit; treatment of land as a separate factor; and sensitivity analysis with assumed elasticity/parameter values. In the context of value added tax (VAT), it was observed that if effective rates were different across sectors, the nature of distortions could be different. It was suggested that a hypothetical SAM could be generated for use as the base with uniform effective rates across all sectors to analyze the implications of different tax regimes. Given the importance of microcredit in Bangladesh, the possibility of incorporating micro credit with a simple financial module could be explored. Similarly, the treatment of intra-household transfer payments could be considered. The participants emphasised on increased involvement of policy making community to enhance impact of modeling efforts in the country.

India

The Indian paper highlighted two variants of the CGE model incorporating (i) fixed labour supply, and (ii) labour efficiency into the systems (e.g. role of education and health). Simulation results analysed policy implications of tax, tariff and expenditure changes on different socioeconomic groups. The discussion on the paper emphasised on the importance of linking the impact of liberalisation and other reforms to distributional and other consequences. Several areas were suggested where further efforts could be directed e.g. how to satisfactorily model human capital formation (education, health, nutrition), indepth investigation of specific issues (e.g. sensitivity analysis of changes in Gini coefficient), satisfactory modeling of the public sector and focus on key issues in the reform agenda. Similarly, the contributory factors towards increasing trends in income inequality could be further elaborated along with possible implications (e.g. robustness of model results to alternative parameter values). The modeling exercise could also explore the possibility of incorporation of unemployment/wage rigidity and separate rural/urban labour markets, relevant issues of liberalization, and mobility of capital/labour. It was suggested that identification of key areas and indepth analysis of specific issues along with sensitivity analysis would be crucial in order to provide specific recommendations to the policy makers.

Nepal

The paper highlighted the overall progress of MIMAP –Nepal activities. The simulations with the CGE framework covered three aspects e.g. reduction of import duty, currency depreciation and increased wage of skilled labour. The discussion covered several issues such as updating the SAM, construction of Input-Output table, mapping of households based on activities/sectors (e.g. agriculture and non-agriculture sector) and disaggregation by regions. It was suggested that one could follow the procedural steps backward to establish credibility of the model results. It was observed that the structure of the model and the linkages between factors/markets should be properly specified to highlight intersectoral linkages of value- added and links between prices and factor market with income distribution. It was also suggested to explore the possibility of calculating ERP using both partial and general equilibrium framework to compare the results.

Pakistan

The paper provided a CGE framework to analyse the impacts of trade liberalisation on income distribution in Pakistan. The model was calibrated using a SAM for 1989/90 with an aggregated household sector and the impacts of tariff reduction on household income from different sources and household consumption were examined. It was informed that work was progressing to integrate disaggregated household sector covering four income groups for rural and urban areas along with other modifications into the model. The paper also provided an overview of the proposed future extension of the modeling framework to analyse MIMAP concerns e.g. extension and improvement of the SAM; disaggregation of the aggregate labour account by occupation groups and model extension to analyse distributional impact across households for rural and urban areas of Pakistan.

The discussions suggested that further development of the model should be directed to a number of areas e.g. appropriate disaggregation of the present SAM; use of more realistic functional forms in model structure (e.g. CES); specification of appropriate numaraire; relevant market structure and closure rules; and differential capital prices across sectors. It was emphasised that simulations should be undertaken to analyse the impact of financial liberalization including non-tariff reforms.

Philippines

The Philippine paper concentrated on analyzing the effects of trade reforms on resource allocation and income distribution. The paper further extended its coverage on food availability through the household model. Under the proposed future action plan, the following areas were identified: modeling of the modern sector incorporating oligopolistic characteristics (e.g.mark up pricing in product markets, wage rigidity in labour market); implications of alternative methods of financing budget deficit such as domestic borrowing, foreign borrowing and central bank financing; the impact of changes in government expenditures on social sectors and other specific expenditures and interest payments; and alternative market structures.

Several specific issues were highlighted during the discussion e.g. mechanisms of linking the economy wide and the household models; specific policy implications regarding the impact of trade liberalization on income distribution and other consequences; rationalization of inter-sectoral resource shifts (e.g. between agriculture and manufacturing sectors) and homogenity/mobility of labour. The workshop suggested to re-examine the decile group classification of households and relate them to socioeconomic groups and emphasised on providing policy guidance on the basis of model simulations.

2. Follow-up Discussions

During the follow-up discussions, several issues relating to general equilibrium framework and MIMAP approach were raised.

Professor John Whalley observed that

- In academic work, the trend is to emphasise on issue-driven and small models with numerical simulation emerging as second best option. There also seems to be appearing greater diversity in the use of such models;

- In case of application in policy and decision making process, there has been a sharp acceleration in use of such models during recent years. One should also note the `propaganda' use of such models. The demand, however, is for multipurpose models with simple structure utilising the latest data and having the capability to explore in-depth implications.

- In terms of MIMAP modeling framework, several concerns should be addressed e.g. applicability of model results in policy making; identification of key parameters in model simulation; appropriate structure of the model to analyse the issues concerned keeping in view the fact that the models are as relevant as their weakest links; logical rigor and realism of the model and its satisfactory calibration.

- In terms of identifying needs and the scope of technical assistance, the purpose of the modeling exercise should be well-defined to determine the appropriate analytical forms, data requirements and execution of the research.

- The required technical assistance should be clearly defined in terms of both country specific and cross-country requirements, with a clear focus on a concrete agenda of the MIMAP work, with well structured mechanisms to gain access to information/communication flows among the countries and with IDRC (e.g. the relevance of a Steering Committee with well-defined functions could be explored) to generate time-bound activity schedules and concrete suggestions to IDRC.

It was suggested by Dr. Paul Dorosh that there was a need to create a wider base of GE modelers in each country with better training and modeling capability to sustain capacity building; organise training sessions to create a core group to identify the issues and provide feed back/comments; develop a simple model to serve as a training tool; examine model/SAM structure in terms of adequacy to address the stipulated issues; provide more focus to food/agriculture sector in addressing poverty concerns; and to labour market closure options both in rural and urban areas.

Dr. Bernard Decaluwe observed the differential needs across countries in the training area. He suggested that the basic training needs and country-specific requirements could be integrated within a flexible framework along with appropriate role of distant learning mechanism. Training and technical meetings involving national modelers and resounrce persons could be organised within a well-defined and need-specific format e.g. with a duration of one week or more combining national presentations, plenary sessions, expert committee meetings to examine the status of country models, technical sessions with specific country researchers and preparation of specific follow up action plans. It might be useful to circulate the papers, along with annexes containing the GAMS code, at least 2/3 weeks prior to the workshop, he added.

It was suggested that the country modelers should work out appropriate modalities to proceed with the above. For the purpose, a Steering Committee of the MIMAP modelers could be formed to work out the details, adopt a research-driven and learning by doing approach, prepare relevant training programmes and suggest other actions. A process approach should be followed to create effective modeling groups in each country to result in fairly well-articulated country models. For effective functioning of the mechanism, the managerial responsibilities should be given to specific country group (MIMAP team) who would work out the programmes regularly (e.g. training/workshop every six months or as deemed necessary).

In short, the requirements were broadly identified in terms of:

- Training;
- Technical support;
- Access to technical and model-related developments and literature
- Regular interaction mechanisms with relevant experts on specific CGE modeling issues;
- Forum for detailed discussion on all aspects of country CGE models;

- Alternative ways of addressing data/information problems;
- Country level capacity building to sustain effective modeling groups;
- Enhanced interactions with policy makers and user groups to ensure relevance and usage of modeling efforts and create desired impacts.

3. Follow-up Proposal to IDRC

The workshop provided the MIMAP country modelers with a useful forum to interact and learn from each other and receive guidance for future planning of activities from the resource persons. It was unanimously resolved that mechanisms should be evolved to pursue such interactions in a regular and well coordinated manner. For ensuring the above, it is proposed that a Steering Committee (SC) be formed with representatives of modelers of MIMAP projects in the region. The SC will prepare the detailed modalities and the work plan to pursue the concerns identified in the workshop and provide a regular forum of interaction and collaboration among the researchers. To begin with, it would submit a detailed annual work plan to IDRC for consideration. For effective coordination, it is necessary for a specific MIMAP project to provide management support to the SC. It is proposed that MIMAP-Bangladesh be entrusted with the responsibility.

If the above arrangements are acceptable to IDRC, the SC will be formally established to work out the proposal for submission.

Regional Workshop on Modeling Structural Adjustment and Income Distribution: CGE Framework

CIRDAP HQs, Dhaka
16-17 May 1999

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Regional Workshop on Modeling Structural Adjustment and Income Distribution: CGE Framework

CIRDAP HQs, Dhaka
16-17 May 1999

Programme

May 15 (Saturday), 1999 : **Arrival of the Participants**

May16 (Sunday), 1999

09:30 - 09:40 : ***Initiation***

Technical Session I

*Designated **Discussants***:

- Prof. John Whalley, Department of Economics, The University of Western Ontario, Canada.
- Dr. Bernard Decaluwe, Centre de Recherche en Economie et Finance Appliquees (CREFA), Quebec, Canada.
- Dr. Paul Dorosh, IFPRI, Dhaka

09:40 - 11:10	:	Presentation on CGE Model – Philippines
	:	Discussion
11:10 - 12:40	:	Presentation on CGE Model – India
	:	Discussion
12:40-13:30	:	Lunch
13:30 - 15:00	:	Presentation on CGE Model – Bangladesh
	:	Discussion
15:00-15:15	:	Tea/Coffee

15:15 - 16:45	:	Presentation on CGE Model – Pakistan
	:	Discussion
16:45- 17:00	:	Wrap-up
19:30-	:	Welcome Dinner by CIRDAP

May 17 (Monday), 1999

Technical Session II

Designated ***Discussants***:

- Prof. John Whalley, Department of Economics, The University of Western Ontario, Canada.
- Dr. Bernard Decaluwe, Centre de Recherche en Economie et Finance Appliquees (CREFA), Canada.
- Dr. Paul Dorosh, IFPRI, Dhaka

09:30 - 11:00	:	Presentation on CGE Model - Nepal
	:	Discussion
11:00 - 11:15	:	Tea/Coffee
11:15 - 12:00	:	Presentation by: - Prof. John Whalley - Prof. Bernard Decaluwe on `Poverty Analysis within a General Equilibrium Framework' - Dr. Paul Dorosh
12:00-13:00	:	Discussion and Follow-up actions
13:00 - 14:00	:	Lunch

May 18 (Tuesday), 1999 ***Departure***

Papers Presented in the Workshop

A. Poverty Analysis Within General Equilibrium Framework

POVERTY ANALYSIS WITHIN A GENERAL EQUILIBRIUM FRAMEWORK

By

B. Decaluwé,[1] A. Patry,[1] L. Savard[1] and
E. Thorbecke[2]

May 1999

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[2]Cornell University, Ithaca, USA

SOCIAL ACCOUNTING MATRICES AND GENERAL EQUILIBRIUM MODELS IN INCOME DISTRIBUTION AND POVERTY ANALYSIS

Overview

The main objective of this paper is to show how Social Accounting Matrices and Computable General Equilibrium Models can be used to highlight and address issues related to income distribution and poverty. The paper is divided into two major parts. Part 1 presents the concept of the Social Accounting Matrix (SAM) as a comprehensive, consistent and disaggregated data system and shows how the SAM methodology can be used to analyze issues related to income distribution and, in a much more limited way, poverty. A prototype SAM reflecting the socio-economic characteristics of an archetype African economy is postulated and used to illustrate the interrelationship among the structure of production, the factorial income distribution, the income distribution by socio-economic household groups and the expenditure pattern of those groups.

Part 2 is devoted to the presentation of a Computable General Equilibrium (CGE) model calibrated on the above archetype African SAM. One major innovation in the specification of the present CGE is that it goes part way in endogenizing the poverty line and the resulting poverty incidence among the different socioeconomic household groups. The model is used to simulate the impact of two exogenous shocks (a fall in the price of the export crop and an import tariff reform) specifically on poverty. An interesting feature of the model is that the effects of the shocks on such endogenous variables as product and factor prices; the structure and composition of output, exports and imports; the pattern of employment are traced through in terms of their ultimate impact on poverty.

Part 3 concludes.

1. SOCIAL ACCOUNTING, INCOME DISTRIBUTION AND POVERTY

1. 1 Introduction

The genesis of the Social Accounting Matrix (SAM) goes back to Richard Stone's pioneering work on social accounts. Subsequently Graham Pyatt and Erik Thorbecke (1976) further formalized the SAM and showed how it could be used as a conceptual and modular framework for policy and planning purposes. [1]

The SAM is a comprehensive, disaggregated, consistent and complete data system that captures the interdependence that exists within a socioeconomic system. Thus, depending on the classification scheme used to record transactions and the extent of disaggregation, the SAM can provide useful information about such key issues as intersectoral linkages (such as between agriculture and industry); interregional flows within an economy; the determination of the income distribution by socioeconomic groups given the structure and technology of production and the resource endowments of these groups; and the relationship between a given regional economy and other regional economies within a nation, and with the rest of the world.

Alternatively the SAM can be used as a conceptual framework to explore the impact of exogenous changes in such variables as exports, certain categories of government expenditures, and investment on the whole interdependent socioeconomic system, e.g. the resulting structure of production, factorial and household income distributions. As such the SAM becomes the basis for simple multiplier analysis and the building and calibration of a variety of applied general equilibrium models. The SAM as a data system and as a conceptual framework is discussed in section 1.2. Section 1.3 is devoted to a crucial issue in building and using a SAM, i.e. that of the appropriate classification and disaggregation scheme applying to the various accounts. The chosen taxonomy and the level of disaggregation depend critically on the questions that the SAM methodologies are expected to answer. If the SAM is to be used to explore issues related to income distribution then the household account is to be broken down into a number of relatively homogeneous household groups reflecting the socioeconomic characteristics of the country or region under consideration. Alternatively, if the purpose of the SAM is to analyze intersectoral linkages, then a relatively detailed sectoral disaggregation of production activities using such criteria as characteristics of the good or service produced and type of technology employed in production is called for. In section 1.3, criteria relevant to building appropriate taxonomies for each of the major SAM accounts (i.e. production activities cum commodities, households, factors, government, capital, and rest of the world) are discussed.

Section 1.4 is devoted to a discussion of the different data sources needed to construct a SAM and the processes through which inconsistencies among these data sources (e.g. regional and national income accounts data, input-output information, household income and expenditure surveys, agricultural and industrial censuses) can be reconciled. The SAM is almost an ideal instrument within which consistency checks among different data sources can be undertaken, inconsistencies reconciled and data gaps identified. Often these data gaps can be remedied through new surveys and other types of data collection and errors corrected--particularly when the preparation of the SAM is institutionalized within a Central Statistical Bureau, as is presently the case in Indonesia.

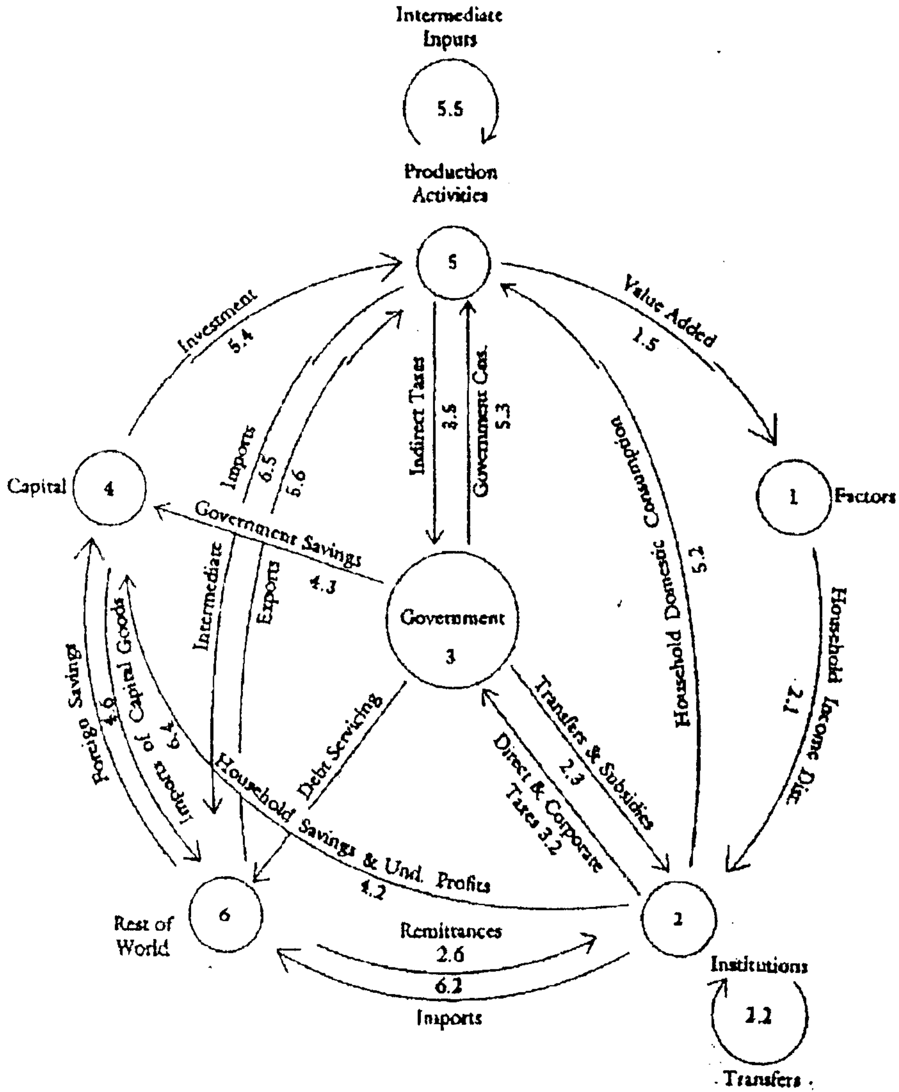
In section 1.5 the SAM-based multiplier methodology is presented. In particular the impact of exogenous shocks such as exports, government programs and investment on the structure of production, the factorial and the income distributions is analyzed. A SAM of an archetype African economy is presented and used to explore the multiplier impact of different shocks. This archetype SAM provides the foundations upon which the CGE model is calibrated in Part 2.

Table 1
A basic social accounting matrix (SAM)

Receipts				Expenditures: 1	2a	2b	3	4	5	6	
					Institutions						
					Current accounts			Combined capital account			
				Factors of production	Households	Companies	Government		Production activities	Rest of the world combined account	Totals
1	Factors of production								Value added payments to factors	Net factor income received from abroad	Incomes of the domestic factors of production
2a	Institutions	Current accounts	Households	Allocation of labour income to household	Current transfers between households	Profits distributed to domestic households	Current transfers to domestic households			Net non-factor incomes received from abroad	Incomes of the domestic institutions after transfers
2b	Institutions	Current accounts	Companies	Allocation of operating surplus to companies			Current transfers to domestic companies				
3	Institutions	Current accounts	Government		Direct taxes on income and indirect taxes on current expenditures	Direct taxes on companies plus operating surplus of state enterprises		Indirect taxes on capital goods	Indirect taxes on inputs	Net non-factor incomes received plus indirect taxes on exports	
4	Institutions	Combined capital account			Household savings	Undistributed profits after tax	Gov't current account surplus			Net capital rec'd from abroad	Aggregate savings
5	Production activities				Household consumption expend. on dom. goods		Government current expenditure	Investment expenditures on domestic goods	Raw material purchases of domestic goods	Exports	Aggregate demand — gross outputs
6	Rest of the world combined account				Household consumption expend. on imp. goods			Imports of capital goods	Imports of raw materials		Imports
	Totals			Incomes of the domestic factors of production	Total outlay of households	Total outlay of companies	Total outlay of government	Aggregate investment	Total costs	Total foreign exchange receipts	

Source: Thorbecke (1988)

Figure 1
Plow Diagram of SAM Transactions



[1]The flow diagram reflects exactly the transactions and transformations appearing in the SAM on Table 1. Note that transactions are numbered in a way consistent with the numbering of the Accounts in Table 1. For example, the allocation of value added is a receipt for the Factor Account (#1) and a payment by the Production Activities Account (#5); hence, the corresponding transformation (matrix) is denoted by 1.5.

Source: Thorbecke (1988)

The Overall Conceptual Framework

As a data framework, the SAM is a comprehensive and disaggregated snapshot of the socioeconomic system during a given year. It provides a classification and organizational scheme for the data useful to analysts and policymakers alike. It incorporates explicitly various crucial relationships among variables such as the mapping of the factorial income distribution from the structure of production and the mapping of the household income distribution from the factorial income distribution. Table 1 presents a basic SAM. It can readily be seen that it incorporates all major transactions within a socioeconomic system. Whereas the SAM in Table 1 is a snapshot of the economy, Figure 1 which reproduces all of the transformations appearing in Table 1, can be interpreted more broadly as representing flows (over time) which, in turn, have to be explained by structural or behavioral relationships.

Table 1 presents all the above flows in a basic SAM. A SAM is a square matrix in which each transactor or account has its own row and column. The payments (expenditures) are listed in columns and the receipts are recorded in rows. As the sum of all expenditures by a given account (or subaccount) must equal the total sum of receipts or income for the corresponding account, row sums must equal the column sums of the corresponding account. For example, the total income of a given institution (say a specific socioeconomic household group) must equal exactly the total expenditures of that same institution. This is the economic analog of the physicists' law of conservation of energy. Hence, analysts interested in understanding how the structure of production influences the income distribution can obtain useful insights by studying the SAM.

In the basic SAM of Table 1, six accounts are distinguished. Production activities produce different sectoral goods and services (e.g. textile products) by buying raw materials and intermediate goods and services (from the region under consideration, other regions within the nation and from abroad). In addition these accounts pay indirect taxes to the government and the remainder is, by definition, value added that is distributed to the factors of production (see column 5). Production activities receipts (row 5) derive from sales to households, exports and the government. In the present formulation of the SAM no distinction is made between production activities and commodities. For the sake of simplicity, it is [illegible] that a production activity is equivalent to [illegible] between production activities and commodity accounts. This would be the case when a given production activity produced different commodities, for example, so that these two sets of accounts would require different sectoral breakdowns. For this reason, many SAMs include both production activities and commodities accounts. When commodity accounts appear in a SAM they can best be seen as representing a region's or nation's product markets. Thus the SAM of an archetype African economy that is presented in Section 5 includes both a production and commodity accounts.

Factors of production accounts typically include labor and capital subaccounts. They receive income (recorded in row 1) from the sale of their services to production activities in the form of wages, rent and net factor income received from abroad or from other regions (corresponding to the value added generated by the production activities).

In turn, these revenues are distributed (col. 1) to households as labor incomes and 1 companies as distributed profits.

Institutions include households (typically further broken down by socioeconom groups), companies (i.e. firms) and the government. From row 2a, it can be seen th households receive factor income (wages and other labor income, rent, interest ar profits) as well as transfers from government and from the rest of the nation and wor (e.g. remittances). Households' expenditures (in column 2a) consist of consumption c goods from the region, from other regions and from abroad, and income taxes wi residual savings transferred to the capital account. Companies (2b) receive profits an transfers and spend on taxes and transfers with their residual savings channeled into the capital account.

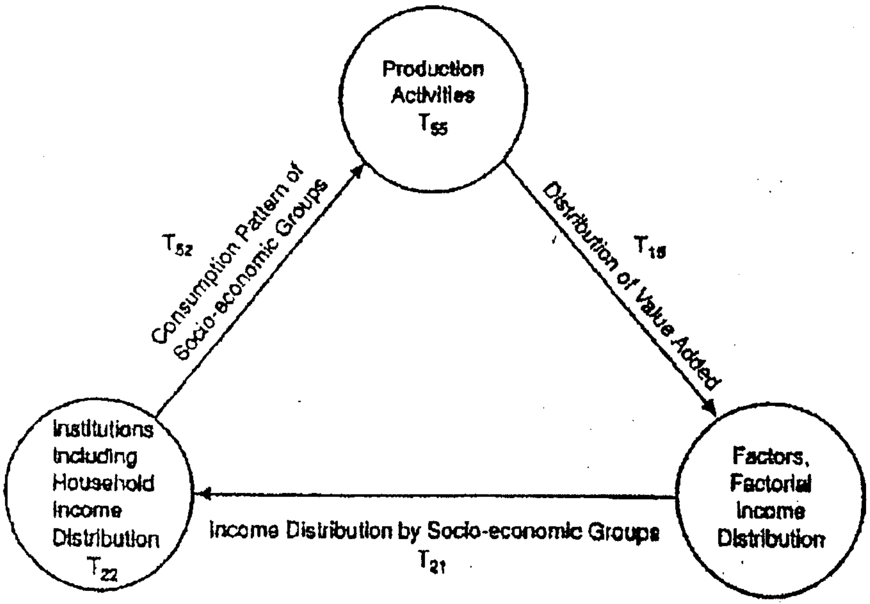
The government account (3) is distinct from administrative public activiti included in the production activities' account. These public services (such as educatio buy intermediate goods, pay wages and deliver public and administrative services. Th government account per se allocates its current expenditures on buying the servic provided by the production activities account. Other government expenditures (col. 3 are transfers and subsidies to households and companies and the remaining savings a transferred to the capital account. On the income side, the government receives ta revenues from a variety of sources and current transfers from abroad (row 3).

The fifth account is the combined capital account. On the income side (row 4) collects savings from households, companies, the government as well as foreign an other regions' savings and, in turn, channels these aggregate savings into investment (co 4).

Finally, transactions between domestic residents, and foreign resident respectively, are recorded in the rest of the world accounts (6). These transactior include, on the receipt side, households' consumption expenditures on imported fin goods as well as imports of capital goods and raw materials (row 6). The econom receives income from the rest of the nation and world (col. 6) from exports and factor an nonfactor income earned. The difference between total foreign exchange receipts an imports is by definition net capital received from abroad or the rest of the nation an extraregional and foreign savings.

The SAM framework can also be used as a conceptual framework and as basis for modeling. In this case the generating mechanisms influencing the flow appearing in Figure 1 have to be spelled out explicitly and quantitatively. Whereas th SAM in Table 1 is a snapshot of the economy, Figure 1 which reproduces all of th transformations appearing in Table 1, can be interpreted more broadly as representin flows (over a period of one year) which, in turn, have to be explained by structural c behavioral relationships.

Figure 2 **Simplified relationship among Principal SAM accounts (Productive activities, Factors and Institutions)[a]**



Source: Thorbecke (1992)

The first question to address in a SAM-based framework is which accounts shoul be considered exogenous and which endogenous. It has been customary, and it : certainly logical in the context of this specific study, to consider the government, the re of the world and the capital account as exogenous and the factors, institutions, an production activities' accounts as endogenous. To illustrate how the SAM approac lends itself to deriving the ultimate income distribution and expenditure pattern b socioeconomic groups following, say, a change in the structure of production resultir from government actions or a change in exports, distinguishing between th determination of primary and secondary income distribution is useful. Thus, a distinctio is drawn between primary claims on resources which arise directly out of the productiv process of work and accumulation, and secondary claims that result from the transfer (primary claims. The former results from prevailing patterns of 1) production and 2 resource endowment (human capital, physical capital and land) among households.

The primary income distribution is determined through the triangulः interrelationship linking production activities, factors and households. In figure 1 th interrelationship appears as the value added flow (denoted by arrow 1.5) from productio activities to factor incomes; from the latter to household income determination an distribution (2.1) which yields, ultimately, the household domestic consumption patter (5.2). While the primary income distribution is by far the most important determinant (incomes received by the various socioeconomic groups, a secondary income distributio may work through the family, village, or, more important, through the state in the form (transfers and subsidies (2.3) and taxes (3.2). Figure 2 reproduces this same key triangul interrelationship among production activities, the factorial income distribution and th household income distribution that is emphasized throughout this paper.

If we are to understand and explain, in an operational way, the mechanism through which these transformations occur, great care must be exercised in designin appropriate classification schemes for each of the three endogenous accounts. Thes transformations incorporate the mechanisms that translate the generation of value adde by production into the incomes of different types of households and other institution: The link is provided by factors of production. The level and structure of output by th different activities generate the aggregate demand for labor of different types, natur resources and capital services. Hence, employment enters into the analysis. The strear of value added, from the production side, rewards the factors of production, with wage going to different types of labor, rent going to land and other resources, and profits t capital. In this way a picture is obtained of the factorial distribution of income which captured in Table 1 by the interface between column 5 and row 1 and, analogously, t matrix T_{15} in Figure 2. With regard to production activities, four criteria sugge themselves in deriving an appropriate classification: 1) the nature of the item produce be it a good, service or commodity; 2) the type of technology used, in terms of labor an capital intensity, 3) the form of organization underlying the production process (i.e. fan or firm relying on family labor and self employment, as opposed to an incorporated, (even a state enterprise); and, 4) whether the commodities are tradable or nontradable.

In turn, the classification of factors and households should be consistent with our interest in employment and equity issues as they relate more particularly to rural areas—as poverty is endemic in these areas. With the qualification that any ultimate taxonomy should be country specific, the following breakdown of factors may be suggested: 1) family labor (further broken down between unpaid and paid and self-employed and hired, and, if possible, distinguishing, as well, between male and female labor); 2) unskilled labor (with some of the same additional distinctions as in the above category; 3) skilled labor; and, 4) capital (which could be land or other forms of capital).

Translation from factorial distribution to the distribution of incomes across institutions, and particularly across different household groups, depends on which institutions own which factors. Thus, for example, wage payments to unskilled labor go to the households that provide semi-skilled labor; imputed labor income is received by small farmers from the services performed by self-employed family labor on their own farms, while rent income (whether imputed or not) accrues to the owners of land and other natural resources, and finally, profits accrue to owners of capital. This second transformation is shown in Table 1 by the interface between column 1 and row 2, as well as by matrix T_{21} in Figure 2. Three main criteria appear important in classifying households: a) location; b) resource endowment and wealth; and c) occupation of the head of the household. Location, particularly between rural and urban areas, is a crucial criterion largely on the grounds that policy often has a locational element and often an urban bias. Resource endowment is important at several levels. Access to land is a critical consideration in rural areas and the landless can be affected quite differently from the smallholder, or large farmers, by development policy. Likewise, the better educated in both the urban and rural areas are able to land jobs in formal and organized activities, whereas the uneducated are limited to employment opportunities largely in traditional agriculture and informal urban activities. The endowment of land and human capital is a crucial determinant of the ultimate income distribution and standards of living of the various socioeconomic household groups.

A third transformation in Figure 2 yields the consumption pattern of the different socioeconomic groups (interface between column 2a and row 5 in Table 1 and matrix T_{52} in Figure 2). It reveals the value of the commodities (assumed here to be equivalent to production activities) consumed by these groups. This transformation provides crucial information on the living standards of the various groups and the extent to which they are able to satisfy their basic needs. Thus, in the CGE model presented in Part 2 we specify consumption functions of the linear expenditure type that predetermine a basic needs income. Two final endogenous transformations appear in Figure 2 reflecting transfers occurring within, respectively, the production activities' account and the institutions account. T_{55} represents the matrix of intermediate demand by production activities and is nothing else than the conventional Input/Output table. T_{22} captures transfers among institutions and, in particular, transfers from some relatively better off socioeconomic groups to other poorer groups.

At this stage, one qualification needs to be made. Whereas the SAM approach explains the determination of total incomes accruing to the various socioeconomic groups, it does not generate the intra-group income distributions. To the extent th poverty tends to be concentrated in a few groups, such as the landless and small farme in rural areas and the informal sector workers in urban areas, between-group variance likely to explain a reasonably high proportion of total income variance in society. If on wants to approximate more exactly the impact on poverty of measures affecting th structure of production, knowledge of the income distributions within socioeconomi groups is necessary because poor households (those with incomes below a give normative poverty line) are likely to be found even in socioeconomic groups enjoyin average income levels significantly higher than the poverty line. Thus, in Part 2, where model of an archetype African economy is specified we postulate the intra-househol group income distributions for the different socio-economic groups.

1.2 Classification and Disaggregation of Accounts

Classification matters in a fundamental sense whether the SAM is used as diagnostic tool to understand better the underlying interdependent socioeconomi structure of an economy, or as a conceptual framework and basis for modellin Economic concepts and variables must be represented in a SAM by appropriatel corresponding classes and categories. To each conceptual framework, there must be corresponding taxonomic and data system.

What are some of the key issues in deciding on a SAM classification scheme First, the level and extent of disaggregation deserve consideration. In many instanc given the policy issues a SAM is supposed to address, fairly aggregative SAMs broke down in relatively few categories will do. However, since it is always possible consolidate and aggregate subaccounts—but not the other way around--it may be better start at a level of disaggregation which is as detailed as data reliability allows. Secondl the degree of homogeneity is crucial in the design of classifications. For example, in classification of household groups, one would like to identify groups that are relativel homogeneous in terms of income sources and levels and expenditure patterns.

It has been argued that every classification should meet certain requirements if is to be used in a SAM. A SAM taxonomy should a) correctly reproduce th socioeconomic and structural (production) stratification within the society and econom b) distinguish relatively homogeneous groups and categories; c) be composed socioeconomic groups that are recognizable for policy purposes and useful f socioeconomic analysis (i.e. specific target groups should be identified); d) be based o comparatively stable characteristics that can be measured relatively easily and reliabl and e) be derivable from (a combination of) existing data sources (Alarcon Rivero et al 1986).

Applying these criteria to household groups, it is noteworthy that a househo classification based on income or expenditure brackets does not satisfy any of the requirements--except perhaps the first one. Since the poorest segment of society (say th bottom decile of the income pyramid) may include very different household heads suc as a landless agricultural worker and an urban informal sector worker, policies aimed at improving conditions in the two cases are likely to be very different.

There is no unique (standard) classification scheme or way of disaggregating and organizing the data in a SAM. The taxonomy used in any given SAM depends on the prevailing country or region specific characteristics and the objectives of the studies underlying the building of the SAM. In a SAM that emphasizes intersectoral linkages, the level of disaggregation of production activities needed to capture the structure of production is likely to be much smaller in poor developing countries than in an industrialized one. A SAM that is supposed to be used as a basis for exploring income distribution issues needs a finer disaggregation of socioeconomic household groups than one not highlighting income distribution.

Each account appearing in Table 1 can be disaggregated. A common approach is to start with selecting the most robust and appropriate classification criteria and then breaking the latter down further into subcriteria and subsubcriteria following a hierarchical top-down tree structure. In what follows major criteria and subcriteria typically used in the classification and disaggregation of the different accounts are mentioned briefly:

Production activities cum commodities

a) Production activities - two digit or three digit International Standard Industrial Classification (ISIC); further broken down according to technology level (e.g. distinguishing between formal and informal technologies for the same type of product; size of firms in terms of number of employees; domestic vs. foreign owned; location; tradable vs. nontradable)

b) Commodities - nature of the good or service fulfilling similar needs; tradable vs. nontradable; local vs. imported.

Institutions

a) Households - location (e.g. rural vs. urban); asset ownership (particularly land ownership in the rural areas and human capital in urban areas); characteristics of the head or main earner, distinguishing by main employment status, main occupation, main branch of industry and educational attainment, sex, main language, race (tribal) kinship; (see Figure 3);

b) Companies - ownership (distinguishing between national and foreign, and private and public status, respectively); legal status (incorporated vs. unincorporated and some family enterprises);

c) Government - central vs. local and breakdown by capital and current expenditure categories.

Factors of production

a) Labor - occupation (distinguishing by skill level and occupational category); wage employment vs. self-employment; location; education; sex; age; type and size of firm;

b) Land and other natural resources - land type and fertility; size of the holding; location; and

c) Capital - domestic vs. foreign, private vs. public and type or vintage of capital good.

A great strength of the SAM is that it explicitly breaks down households into relatively homogeneous socioeconomic categories that are recognizable for policy purposes and exhibit relatively stable characteristics. This type of disaggregation allows the SAM to be used to analyze the effects of government policies on income distribution (see specific examples in sections 5 and 6). Although any classification is essentially arbitrary, there are many instances of effective classification such as the Standard Industrial Classification and the Standard Occupational Classification designed and used by Central Statistical Bureau. Recently the community of statisticians designed and recommended the adoption of a hierarchical classification of households which shows a top down tree structure at different levels. This proposed taxonomy is reproduced in Figure 3. (For an interesting discussion of the importance of an appropriate households taxonomies, see Duchin, 1996.)

A final key issue that goes to the heart of defining and deciding on the domain of the SAM and that transcends across accounts is that of regionalization.[2] While most SAM studies have been undertaken with national objectives in mind, yet it has been realized that distinguishing regions within a country SAM can enhance both its realism and its usefulness. If the economy displays significant regional differences in the types of goods produced, structure of production and technology, these differences could affect the standards of living of different household groups. Another important advantage of the explicit inclusion of the regional dimension into a SAM conceptual framework is that a large number of policy means tend to be location-specific. These may include investment projects, current government expenditures on services, such as health and education, and price policies with respect to commodities and inputs at least to the extent that the production of specific commodities is regionally concentrated.

1.3 Data Requirements in the Construction of a SAM

A variety of data sources are required to build a SAM. Because the methods used in collecting and generating statistics differ significantly from one source to another (such as national income accounts, input-output, census information, surveys, etc.) the process of building a SAM provides a natural check on the mutual consistency of these sources and identifies possible data gaps and errors. In this sense the process of reconciliation that is endemic in generating a SAM has social value in its own right.[3] There are different

[2] This subsection on regionalization draws on Thorbecke (1985).

[3] In this connection, it is relevant to note that when a team of resident experts attached to the CBS in Jakarta was trying to build the first SAM for Indonesia in the late 70s, the local Indonesian statisticians only became interested in, and supportive of this exercise when they realized that the SAM provided an

techniques for reconciling and forcing consistency within a SAM that does not balance--the most naïve and mechanical one being the RAS technique. Generally, it is far preferable to use judgments than mechanical approaches in insuring that a SAM is consistent and balanced.

Given the degree of country or regional specificity and the numerous different objectives which construction of the SAM may have, it is not possible to identify a unique and general set of required data. The more disaggregated a SAM is intended to be, the more extensive are the data requirements. Some scholars maintain that 'In all cases, the starting point should be the building of a highly aggregated SAM based on the country's national accounts statistics.' (Sadoulet and de Janvry, 1995, p. 280) Others would contend that a more accurate and sensible approach for regional and interregional analyses and even national is to construct a SAM region by region with interregional flows increasingly disaggregated.

There is no optimal sequence in which to proceed with the construction of a SAM. A good starting point is with the production activities' account since the SAM can be seen as a major expansion on, and extension of an I-O matrix. This would be particularly true when building a SAM for a region as opposed to a country. A recent I-O table can provide the basis for matrix T_{55} appearing in the basic SAM on Table 1, previously discussed. In particular, the I-O table will provide the needed information to fill in the appropriate production activities' row sums in representing the vector of aggregate demands and the corresponding vector of column sums yielding the vector of aggregate supplies (sectoral outputs).

A second step might consist of breaking down value added (matrix T_{15} in Table 1) into income accruing to different labor categories and profits and rent going to one or more capital categories with the help of employment surveys and agricultural and industrial synthesis.

A third step could yield the incomes of the various socioeconomic groups relying on household income and expenditure surveys. Particularly crucial, in this context, is the mapping of the household income distribution from the factorial income distribution (T_{21}). On the household expenditure side, again consumption surveys together with information on taxes available from the government budget should provide the main spring for filling out column 2a of Table 1. With regard to companies, most SAMs aggregate all firms into one category and the information needed to fill in column and row 2b in Table 1 is normally available from national accounts data. The government budget and additional public finance information relating to the sources of government revenues and the composition of government expenditure should yield the required figures for the government account (row 3 and col. 3). Finally, a detailed balance of

ideal framework within which to check data consistency and help reconcile inconsistencies. Soon thereafter the process of building SAMs was institutionalized within the CBS and so far 4 large scale, highly disaggregated SAMs have been prepared and published by the CBS (for 1975, 1980, 1985 and 1990, respectively.

payments supplemented by disaggregated trade statistics should make it possible to record transactions with the rest of the world.

When all the cells (submatrices) of the SAM are filled in based on the above type of primary information for all accounts except for one account (say the capital account), the income row and expenditure column of this last account appears as by magic (a conceptual requirement under Walras' Law). The recorded entries in the SAM for the capital account can then be checked against whatever primary information is available relating to any specific receipt or outlay of that account.

A final data and formatting issue is that the great majority of the existing SAMs contain only a rudimentary breakdown of financial transactions. When one of the objectives of the SAM is to highlight the flow of funds among various financial institutions, households and firms and the portfolios of different financial assets of these institutions, a financial SAM needs to be built.

1.5 SAM Multiplier Analysis an Application to SAM of an African Archetype Economy

If a certain number of conditions are met—in particular, the existence of excess capacity and unemployed or underemployed labor resources—the SAM framework can be used to estimate the effects of exogenous changes and injections, such as an increase in the demand for a given production activity, government expenditures or exports on the whole system. As long as excess capacity and a labor slack prevail, any exogenous change in demand can be satisfied through a corresponding increase in output without having any effect on prices. Thus, for any given injection anywhere in the SAM, influence (e.g. an increase in the export demand for textile products, a government investment or private project leading to an increase in the production of food crops, or a subsidy or transfer accruing to a specific socioeconomic household group) is transmitted through the interdependent SAM system. The total, direct and indirect, effects of the injection on the endogenous accounts, i.e. the total outputs of the different production activities and the incomes of the various factors and socioeconomic groups are estimated through the multiplier process. For example, a public works program resulting in the construction of a new rural farm to market road would require, among others, a significant amount of unskilled labor that is typically provided by the landless and small farmers' household categories. In turn, a significant part of the incremental incomes earned by these two socioeconomic groups from their work on the road project is spent on food demand. The subsequent increase in food production to satisfy that demand leads to still further employment and income increments for these groups, and so on, until the multiplier process dampens.

To derive and illustrate the underlying logic of this methodology, let us at the outset assume, following the previous discussion in Section 1.2, that the only three accounts which are endogenously determined are production activities, factors, and institutions (households and companies), while all other accounts are exogenous (government, capital, and the rest of the world). The resulting simplified SAM is presented in Table 2. Thus the above simplified and truncated SAM consolidates all exogenous transactions and corresponding leakages and focuses exclusively on the endogenous transactions and transformations. Five endogenous transformations appear

Table 2 Simplified Schematic Social Accounting Matrix

				Expenditures				
				Endogenous Accounts			Exog.	
				Factors	Institutions: Households and Companies	Production Activities	Sum of Other Accounts	Totals
				1	2	3	4	5
Receipts	Endogenous Accounts	Factors	1	0	0	T_{13}	x_1	y_1
		Institutions, i.e. Households and Companies	2	T_{21}	T_{22}	0	x_2	y_2
		Production Activities	3	0	T_{32}	T_{33}	x_3	y_3
	Exog	Sum of Other Accounts	4	l'_1	l'_2	l'_3	t	y_x
		Totals	5	y'_1	y'_2	y'_3	y'_x	

Source: Thorbecke (1995)

in Table 2. Note that the three exogenous accounts have been combined together in Table 2 and the sum of the exogenous injections from government expenditures, investment and exports, respectively, has been consolidated into three vectors $\mathbf{x}_1$, $\mathbf{x}_2$, and x_3. The first vector ($\mathbf{x}_1$) represents the total exogenous demand for factors (and hence income injection to reward factors). Similarly $\mathbf{x}_2$ and $\mathbf{x}_3$ represent respectively the total exogenous income accruing to the different socioeconomic household groups and companies from, say, government subsidies, and remittances from abroad and the total exogenous demand for the production activities (commodities) resulting from government consumption, investment and export demand. Likewise l'_i represent the corresponding leakages, from savings, imports and taxation.

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The logic underlying the scheme in Table 2, as will be seen shortly, is that exogenous changes (the x_i's) in Table 2 determine, through their interaction within the SAM matrix, the incomes of the endogenous accounts, i.e., i) the production activities (vector y_3); ii) the factor incomes (y_1); and iii) the household and companies incomes (y_2).

For analytical purposes, the endogenous part of the transaction matrix is converted into the corresponding matrix of average expenditure propensities or coefficients. These can be simply obtained by dividing a particular element in any of the endogenous accounts by the total income for the column account in which the element occurs. From Table 2 it can be seen that A_n is partitioned as follows (i.e. A_n is composed of different subsets of coefficients)

$$\mathbf{A}_n = \begin{bmatrix} 0 & 0 & \mathbf{A}_{13} \\ \mathbf{A}_{21} & \mathbf{A}_{22} & 0 \\ 0 & \mathbf{A}_{32} & \mathbf{A}_{33} \end{bmatrix} \tag{1.1}$$

The subset A_{33} is the set of input output coefficients reflecting the cents worth of inputs per dollar of each production activity's output. The subset A_{13} is the set of cents worth of primary inputs per dollar of output of each production activity. The coefficients of the subset A_{32} show, on average, the cents worth of each commodity (production activity) that each (socioeconomic) household group purchases with each of its dollar of total expenditures. The coefficients of the subset A_{22} shows, on average, the cents worth of income transfers to other household groups per dollar of income. Finally, A_{21} shows the cents worth of each dollar earned by each type of resource (primary input) that is allocated to each of the household groups.

Table 3: Social Accounting Matrix for Archetype African Developing Country

			Factors				Households							Activities						Commodities								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Factors	Unskilled labour	1												365.5	81.0	38.5	474.2	293.2	267.8									1 520.2
	Skilled labour	2												4.5	10.0	144.6	107.8	97.7	202.2									566.8
	Capital	3												72.0	30.0	292.4	955.3	567.1	11.9									1 928.7
	Land	4												361.6	85.0	0.0	0.0	0.0	0.0									446.6
H'holds	Rural workers	5	228.0	0.0	0.0	0.0																			20.0			248.0
	Rural land-owners (small)	6	790.5	0.0	255.9	156.3																			0.0			1 202.7
	Rural land-owners (large)	7	76.0	141.7	511.8	290.3																			0.0			1 019.8
	Urban low education	8	425.7	0.0	85.3	0.0																			20.0			531.0
	Urban high education	9	0.0	226.7	341.2	0.0																			0.0			567.9
	Capitalists	10	0.0	198.4	511.8	0.0																			0.0			710.2
	Entreprise	11			222.7																							
Activities	Agriculture	12																		1 038.3		0.0	0.0	0.0			181.2	1 219.5
	Export Africulture	13																			50.0						231.0	281.0
	Mining	14																		0.0		507.4	0.0	0.0			535.0	1 042.4
	Industries	15																		0.0		0.0	2 135.1	0.0			195.0	2 330.1
	Services	16																		0.0		0.0	0.0	1 325.0			110.0	1 435.0
	Public Services	17																		0.0		0.0	0.0	594.0			0.0	594.0
Comm.	Agriculture	18					95.0	412.7	271.9	171.6	97.1	32.4		204.8		0.0	323.3	0.0	0.0						0.0	274.9		1 883.7
	Exp. Agr.	19					0.0	0.0	0.0	0.0	0.0	0.0			40.0											10.0		50.0
	Mining	20					0.0	0.0	0.0	0.0	0.0	0.0		0.0		19.3	43.1	0.0	0.0						0.0	445.0		507.4
	Industries	21					83.1	402.8	384.2	191.7	242.4	153.1		186.1	30.0	337.5	301.7	143.3	0.0						0.0	50.0		2 505.9
	Services	22					57.5	291.0	271.9	141.2	146.1	98.6		0.0		173.6	43.1	247.6	76.5						471.9	0.0		2 019.0
	Government	23					12.4	60.1	51.0	26.5	28.4	71.0		25.0	5.0	36.5	81.6	86.1	35.6	85.6		0.0	74.2	0.0				679.0
	Accumulation	24					0.0	36.1	40.8	0.0	53.9	365.1	222.7												167.1		-95.8	779.9
	ROW	25																		759.8		0.0	296.6	100.0				1 156.4
	Total		1 520.2	566.8	1 928.7	446.6	248.0	1 202.7	1 019.8	531.0	567.9	710.2	222.7	1 219.5	281.0	1 042.4	2 330.1	1 435.0	504.0	1 883.7	50.0	507.4	2 505.9	2 019.0	679.0	779.9	1 156.4	

Source: Thorbecke and Stifel (1998)

Table 4: Matrix of Average Expenditure Propensities (An) for an Archetype African Developing Economy

			Factors				Households							Activities						Commodities							
			Unsk L 1	Skilled L 2	Capital 3	Agr Cap 4	R worker 5	R own Sm 6	R own lg 7	Urb Low 8	Urb High 9	Capitalist 10	Enter 11	Agr 12	Ex. Agr. 13	Mining 14	Indust 15	Services 16	Pub Serv 17	Agr 18	Ex Agr 19	Mining 20	Indust 21	Services 22	Govt 23	Accum 24	ROW 25
Factors	Unskilled labour	1												0.30	0.29	0.04	0.20	0.20	0.45								
	Skilled labour	2												0.00	0.04	0.14	0.05	0.07	0.34								
	Capital	3												0.06	0.11	0.28	0.41	0.40	0.02								
	Agr. Capital	4												0.30	0.30	0.00	0.00	0.00	0.00								
H'holds	Rural workers	5	0.15	0.00	0.00	0.00																			0.03		
	Rural land-owners (small)	6	0.52	0.00	0.13	0.35																			0.00		
	Rural land-owners (large)	7	0.05	0.25	0.27	0.65																			0.00		
	Urban low education	8	0.28	0.00	0.04	0.00																			0.03		
	Urban high education	9	0.00	0.40	0.18	0.00																			0.00		
	Capitalists	10	0.00	0.35	0.27	0.00																			0.00		
	Entreprise	11	0.00	0.00	0.12	0.00																					
Activities	Agriculture	12																		0.55	0.00	0.00	0.00	0.00			0.16
	Export Africulture	13																		0.00	1.00	0.00	0.00	0.00			0.20
	Mining	14																		0.00	0.00	1.00	0.00	0.00			0.46
	Industries	15																		0.00	0.00	0.00	0.85	0.00			0.17
	Services	16																		0.00	0.00	0.00	0.00	0.66			0.10
	Public Services	17																		0.00	0.00	0.00	0.00	0.29			0.00
Comm.	Agriculture	18					0.38	0.34	0.27	0.32	0.17	0.05		0.17	0.00	0.00	0.14	0.00	0.00						0.00	0.36	
	Exp. Agr.	19					0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.14	0.00	0.00	0.00	0.00						0.00	0.01	
	Mining	20					0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.02	0.02	0.00	0.00						0.00	0.57	
	Industries	21					0.34	0.33	0.38	0.36	0.43	0.22		0.15	0.11	0.32	0.13	0.10	0.00						0.00	0.06	
	Services	22					0.23	0.24	0.27	0.27	0.26	0.14		0.00	0.00	0.17	0.02	0.17	0.13						0.69	0.00	
	Government	23					0.05	0.05	0.05	0.05	0.05	0.10		0.02	0.02	0.04	0.04	0.06	0.06	0.05	0.00	0.00	0.03	0.00			
	Accumulation	24					0.00	0.03	0.04	0.00	0.09	0.50	1.00												0.25		-0.08
	ROW	25																		0.40			0.12	0.05			

From the definition of A_n, it follows that in the transaction matrix, each endogenous total income (y_n) is given as

$$y_n = A_n y_n + x \tag{1.2}$$

which states that row sums of the endogenous accounts can be obtained by multiplying the average expenditure propensities for each row by the corresponding column sum and adding exogenous income x.

Equation (1.2) can be rewritten as

$$\begin{aligned} y_n &= (I - A_n)^{-1} x \\ &= M_a x \end{aligned} \tag{1.3}$$

Thus, from (1.3), endogenous incomes y_n (i.e. production activity incomes, y_3, factor incomes, y_1, and institution incomes, y_2 as shown in Table 2) can be derived by premultiplying injection x by a multiplier matrix M_a. This matrix has been referred to as the accounting multiplier matrix because it explains the results obtained in a SAM and not the process by which they are generated. The latter would require the specification of a dynamic model including the different SAM accounts and variables.

One limitation of the accounting multiplier matrix M_a as derived in equation (1.3), is that it implies unitary expenditure elasticities (the prevailing average expenditure propensities in A_n are assumed to apply to any incremental injection). While this assumption may be defensible for all other elements of A_n, it is certainly unrealistic for the expenditure pattern of the household groups (A_{32}). A more realistic alternative is to specify a matrix of marginal expenditure propensities (C_n below) corresponding to the observed income and expenditure elasticities of the different agents, under the assumption that prices remain fixed.[4] In this case, C_n formally differs from A_n in the following way: $C_{13} = A_{13}$, $C_{33} = A_{33}$, $C_{22} = A_{22}$, $C_{21} = A_{21}$, but $C_{32} \neq A_{32}$.

Expressing the changes in incomes (dy_n) resulting from changes in injections (dx), one obtains

$$\begin{aligned} dy_n &= C_n dy_n + dx \\ &= (I - C_n)^{-1} dx = M_c dx. \end{aligned} \tag{1.4}$$

M_c has been coined a fixed price multiplier matrix and its advantage is that it allows any nonnegative income and expenditure elasticities to be reflected in M_c.

[4]Since the expenditure (income) elasticity for household group h and commodity i namely: γy_{hi} is equal to the ratio of the marginal expenditure propensity (MEP_{hi}) to the average expenditure propensity (AEP_{hi}), it follows that the matrix of marginal expenditure propensities, C_{13}, can be readily obtained once the expenditure elasticities and average expenditure propensities (i.e. A_{13}) are known, i.e. since ,$y_{hi} = MEP_{hi} / AEP_{hi}$, MEP_{hi} = ,$y_{hi} AEP_{hi}$.

Table 3 presents an illustrative example of a SAM for an archetype African developing economy. Although it was calibrated to reflect approximately the socioeconomic structure of Côte d'Ivoire, it should be considered as a demonstration SAM reflecting many of the characteristics of a prototype African economy. The SAM is disaggregated in terms of four factors, i.e. unskilled labor, skilled labor, capital and agricultural capital (i.e. land); six categories of households, i.e. rural (landless) workers, rural land owners (small), rural land owners (large), urban low education (and hence relatively low income), urban high education (high income)[5], and capitalists; and enterprises. Six production activities are identified i.e. domestic agriculture, export agriculture, mining, industries, services, and public services.

Finally, five different commodities are specified i.e. domestic agriculture, export agriculture, mining, industries, and services.

Table 4 which is derived from Table 3 gives the matrix of average expenditure propensities (A_n) for this archetype African economy. A few examples suffice to show the type of information contained in Table 4. Thus, it can be seen that out of total domestic agricultural production unskilled labor receives 30%, capital 6% and agricultural capital 30% (column 12). In turn, total intermediate inputs used in agriculture amount to 32% (column 12). In turn, if one were interested in the consumption pattern of rural workers, one could determine from column 5 that 38% of their total income (equal expenditures) was spent on food commodities (agriculture), 34% on manufacturing goods and 23% on services. Rural workers households save nothing and pay only 5% in taxes.

Finally Table 5 presents the matrix of accounting multipliers for this same archetype economy. Again a few example can illustrate how this multiplier table can be interpreted. As discussed previously, the endogenous accounts are factors, households, activities and commodities while the government account, the capital account and the rest of the world are taken as exogenously determined. Thus, if one were interested in the impact of a change in agricultural exports on the whole socioeconomic system, one could read the corresponding multipliers along column 13 of Table 5. In this case **x** in equation (3) would reflect a change in agricultural exports and a 100 units of reduction in exports would reduce the incomes of rural workers by 12 units, rural land owners (small) by 68 units, rural land owners (large) by 58 units, urban low education households by 26 units, urban high education households by 19 units and finally it would reduce the incomes of capitalists by 24 units (read down column 13 of Table 5). A perusal of Table 5 reveals that changes in different types of exports have very different distributional consequences

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[5] For example, one could classify "low education" households as those in which the head of the household had equivalent of a primary education or less; and "high education" households as those in which the head possessed more than a primary education.

as the intersection of the activities accounts (columns 12-17) and household income accounts (rows 5-10) shows.

Table 5: Accounting Multipliers for the Archetype African Developing Economy

			Factors				Households							Activities						Commodities				
			Unsk. L	Skilled L	Capital	Agr. Cap	R. worker	own sm	R own lg	Urb. Low	Urb. high	Captlst	Enter.	Agr.	Ex Agr	Mining	Indust	Services	Ub Services	Agr	Ex Agr	Mining	Indust	Services
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Factors	Unskilled labor	1	1.5	0.4	0.37	0.5	0.5	0.49	0.5	0.51	0.48	0.23	0,00	0.77	0.81	0.51	0.62	0.65	0.91	0.43	0.81	0.51	0.53	0.69
	Skilled labor	2	0.14	1.12	0.11	0.14	0.14	0.14	0.15	0.15	0.14	0.07	0,00	0.13	0.18	0.29	0.16	0.21	0.48	0.07	0.18	0.29	0.14	0.28
	Capitalists	3	0.57	0.48	1.43	0.57	0.56	0.56	0.58	0.59	0.58	0.29	0,00	0.6	0.69	0.88	0.9	0.92	0.55	0.33	0.69	0.88	0.77	0.77
	Agr. Capital	4	0.14	0.09	0.09	1.13	0.15	0.14	0.13	0.14	0.11	0.05	0,00	0.44	0.48	0.1	0.12	0.1	0.11	0.24	0.48	0.1	0.1	0.1
H'holds	Rural workers	5	0.23	0.06	0.05	0.07	1.08	0.07	0.07	0.08	0.07	0.03	0,00	0.12	0.12	0.08	0.09	0.1	0.14	0.06	0.12	0.08	0.08	0.1
	Rural lan-owners (small)	6	0.91	0.3	0.41	0.73	0.39	1.38	0.38	0.4	0.36	0.17	0,00	0.64	0.68	0.42	0.49	0.5	0.58	0.35	0.68	0.42	0.41	0.5
	Rural land-owners (large)	7	0.35	0.49	0.49	0.96	0.31	0.3	1.3	0.31	0.29	0.14	0,00	0.52	0.58	0.39	0.39	0.39	0.36	0.28	0.58	0.39	0.33	0.37
	Urban Low Education	8	0.45	0.13	0.17	0.16	0.17	0.16	0.17	1.17	0.16	0.08	0,00	0.24	0.26	0.18	0.21	0.22	0.26	0.13	0.26	0.18	0.18	0.23
	Urban High Education	9	0.16	0.53	0.3	0.16	0.15	0.15	0.16	0.16	1.16	0.08	0,00	0.16	0.19	0.27	0.22	0.25	0.29	0.09	0.19	0.27	0.19	0.25
	Capitalists	10	0.2	0.52	0.42	0.2	0.2	0.2	0.21	0.21	0.2	1.1	0,00	0.2	0.24	0.33	0.3	0.32	0.31	0.11	0.24	0.33	0.25	0.3
	Enterprise	11	0.07	0.06	0.17	0.07	0.06	0.06	0.07	0.07	0.07	0.03	1,00	0.07	0.08	0.1	0.1	0.11	0.06	0.04	0.08	0.1	0.09	0.09
Activities	Agriculture	12	0.48	0.31	0.31	0.45	0.51	0.48	0.44	0.48	0.37	0.16	0,00	1.49	0.42	0.32	0.41	0.33	0.37	0.82	0.42	0.32	0.35	0.33
	Export Agriculture	13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1.17	0,00	0,00	0,00	0,00	0,00	1.17	0,00	0,00	0,00
	Mining	14	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0,00	0.02	0.02	1.04	0.03	0.01	0.01	0.01	0.02	1.04	0.03	0.01
	Industries	15	0.87	0.75	0.67	0.88	0.86	0.85	0.89	0.9	0.92	0.45	0,00	0.88	0.9	0.95	1.78	0.77	0.75	0.48	0.9	0.95	1.52	0.73
	Services	16	0.44	0.37	0.34	0.45	0.43	0.43	0.46	0.46	0.44	0.22	0,00	0.36	0.4	0.45	0.34	1.47	0.47	0.2	0.4	0.45	0.29	1.1
	Public Services	17	0.2	0.17	0.15	0.2	0.19	0.19	0.2	0.21	0.2	0.1	0,00	0.16	0.18	0.2	0.15	0.21	1.21	0.09	0.18	0.2	0.13	0.49
Comm.	Agriculture	18	0.87	0.57	0.56	0.82	0.92	0.87	0.79	0.87	0.68	0.29	0,00	0.89	0.75	0.58	0.74	0.6	0.68	1.49	0.75	0.58	0.63	0.6
	Export Agriculture	19	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0.17	0,00	0,00	0,00	0,00	0,00	1.17	0,00	0,00	0,00
	Mining	20	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0,00	0.02	0.02	0.04	0.03	0.01	0.01	0.01	0.02	1.04	0.03	0.01
	Industries	21	1.02	0.88	0.79	1.03	1.01	1,00	1.05	1.05	1.08	0.53	0,00	1.03	1.06	1.12	0.92	0.9	0.88	0.57	1.06	1.12	1.78	0.85
	Services	22	0.67	0.56	0.51	0.68	0.65	0.66	0.69	0.7	0.67	0.34	0,00	0.55	0.61	0.68	0.52	0.71	0.72	0.31	0.61	0.68	0.44	1.68
	Total Factors		2.35	2.09	2,00	2.35	1.35	1.33	1.36	1.39	1.31	0.64	0,00	1.94	2.15	1.78	1.81	1.88	2.05	1.07	2.15	1.78	1.54	1.84
	Total Labor		1.64	1.52	0.47	0.64	0.64	0.63	0.64	0.66	0.62	0.3	0,00	0.9	0.98	0.8	0.79	0.86	1.39	0.5	0.98	0.8	0.67	0.97
	Total Institutions		2.35	2.09	2,00	2.35	2.35	2.33	2.36	2.39	2.31	1.64	1,00	1.94	2.15	1.78	1.81	1.88	2.05	1.07	2.15	1.78	1.54	1.84
	Total Activities		2,00	1.61	1.48	2,00	2.01	1.97	2.01	2.06	1.95	0.94	0,00	2.91	3.08	2.96	2.71	2.79	2.82	1.6	3.08	2.96	2.31	2.66
	Total Commodities		2.58	2.02	1.87	2.55	2.6	2.54	2.56	2.64	2.44	1.17	0,00	2.48	2.61	2.42	2.21	2.23	2.29	2.37	3.61	3.42	2.88	3.14

Besides the exogenous shock consisting of a change in exports, one could think of the shock as consisting of subsidies provided directly by the government to certain household groups—say in the form of direct transfers. For example, if the urban low income group were to receive a direct transfer of a 100 units, it would result in an increase in domestic agricultural production of 48 units and an even higher increase in the production of industrial goods of 90 units (see the intersection of column 8 and row 12 and 15, respectively). In this last example, the mechanism leading to the ultimate increase in agricultural production follows the triangular route of Figure 2. If a given household group receives an (exogenous) direct transfer from the government, this will increase their income and allow to them spend additional consumption items. In turn, this increased demand for commodities has to be satisfied through a corresponding increase in production which leads to a flow of factor earnings (e.g. wages for unskilled and skilled labor) that is next received by the socioeconomic groups possessing those factors of production.

A crucial feature of a SAM is that it provides disaggregated information on income distribution across socio-economic household groups (the row total in Table 3) as well as the factorial sources of income of each household category (i.e. the transaction submatrix T_{21} or coefficient submatrix A_{21} in Table 2). As indicated previously this matrix reflects the resource (factor) endowment of the different household groups. The SAM also reveals the sectoral production origin of factorial income (T_{13} and A_{13}, respectively). This mapping reflects the structure of production and the technology used to produce the different production activities.

Table 6 presents the factorial source of income for each socio-economic group in the archetype African economy.

Table 6: Factorial Source of Household Income (matrix A_{21} in Table 2)

	Unskilled Labor	Skilled Labor	Capital	Land	Transfers	Total
Rural Workers	91.94%				8.06%	100%
Small Rural Landowners	65.72%		21.28%	13.00%		100%
Large Rural Landowners	7.45%	13.89%	50.19%	28.47%		100%
Urban Low education	80.17%		16.06%		3.77%	100%
Urban High education		39.92%	60.08%			100%
Capitalists		27.94%	72.06%			100%

As we can observe in Table 6, the composition of income of each household group is related to its social classification. The incomes of the rural workers, the small rural landowners and urban low education consist mostly of unskilled labor receipts, while large landowners, the urban high education and the capitalist households receive the bulk of their income from capital and land rent.

In Table 7, we present the share of the primary factors in the value-added for each branch of production. The agricultural (traditional and export agriculture) and services (service and public service) sectors are mostly intensive in unskilled labor and the industrial (mining and industries) sectors intensive in the capital primary factor. Skilled labor is used more intensively in the public services branch and in the mining branch. As for land, only the agricultural branches share this resource.

It will be seen in the next section where a CGE is calibrated on the present archetype African SAM and used to simulate among others a trade shock that the latter affects income distribution through its impact on factor employment. In summary the impact of exogenous shocks are transmitted throughout the channels of the socioeconomic system given by archetype SAM. By studying Tables 6 and 7, we can see that a shock affecting the agricultural sectors would have a greater impact on rural household's income than on the capitalist's income.

Table 7: Share of the Primary Factors in the Value-Added

	Agriculture	Export Agriculture	Mining	Industries	Services	Public Service
Unskilled Labor	45.48%	39.32%	8.1%	30.85%	30.61%	55.57%
Skilled Labor	0.56%	4.85%	30.41%	7.01%	10.2%	41.96%
Capital	8.96%	14.56%	61.49%	62.14%	59.2%	2.47%
Land	45.00%	41.26%				
Total	100%	100%	100%	100%	100%	100%

A final issue that needs to be emphasized is that the SAM by itself, can provide only limited information on poverty. Since the SAM, as such, provides information of the total and average incomes received by the respective household groups, it ignores the intra-group income distribution (or more exactly it assumes implicitly that the intra-group variances are zero). It is only if the intragroup income distribution are known that poverty per se can be determined and analyzed. One recent attempt in that direction is that of Thorbecke and Jung (1996). They developed a multiplier decomposition technique focusing more specifically on the extent to which different production activities affect different household groups'incomes and ultimately poverty alleviation and the structural mechanisms and linkages through which an initial rise in a sector's output contributes directly or indirectly to poverty alleviation. The poverty alleviation effects were decomposed into the product of i) the changes in average incomes received by the various household groups resulting, directly or indirectly, from the growth of a sectors'output; and ii) the poverty-sensitivity effects which, in turn, depend on the respective household groups'poverty elasticities with respect to groups' mean-incomes and the intragroup income distributions.

Part of this paper proceeds to incorporate intra-group income distributions as well as the derivation of the poverty line and the measurement of poverty within a general equilibrium framework.

2. GENERAL EQUILIBRIUM MODELS, INCOME DISTRIBUTION AND POVERTY

2.1.1 Introduction

Computable General Equilibrium (CGE) models have traditionally been used to simulate the impact of exogenous shocks (such as changes in international terms of trade, and a recession in importing countries) and changes in policies on the socio-economic system and, in particular, the income distribution. Good examples of such models are those that were built in connection with the OECD research program to explore the impact of structural adjustment on equity (see e.g. Thorbecke, 1991, for Indonesia; de Janvry et al., 1991, for Ecuador; Morrisson, 1991, for Morocco). Still an additional model developed in the context of Africa is that of Chia et al. 1994. These models allowed the impact of counterfactual policy scenarios to be simulated on income distribution. Since CGE models are fully calibrated on the basis of an initial year SAM that provides a set of consistent initial conditions—and the SAM, as such, does not contain information on intra socioeconomic household group income distribution it follows that conventional CGEs can only simulate the impact of a shock on the representative household in each group. This amounts to the implicit assumption that the variance of income within a group is zero. To the extent that poverty is pervasive and is likely to affect many socioeconomic groups (albeit to different degrees) it appears essential in any analysis of the impact of a shock on poverty to start with information on intra-group income distribution. Increasingly as more income and expenditure surveys become available, it is possible to generate the within-group income distributions prevailing in the same base year as that of the SAM used to calibrate the general equilibrium model.

There have been some attempts in the literature to postulate given intragroup distributions and assessing the impact on poverty through a general equilibrium model. Thus, for example, de Janvry et al. (1991) use both the lognormal and the Pareto distribution functions to depict income distribution of each household group. The authors do not justify why these functional forms are more appropriate than more flexible forms. In Adelman and Robinson (1979), a statistical test is performed on the lognormal, and in some cases the test (skewness and kurtosis) were not satisfactory. They simply eliminated a socio-economic group (by aggregation) to circumvent the problem. The income distribution modelling approach and the statistical literature provide evidence that other functional forms might be more appropriate to represent income distribution (see Bordley, McDonald and Mantrala, 1996).

We follow these authors by assessing poverty through a general equilibrium model. However, we differ from their approach in three ways. The first is by proposing a more flexible income distribution function. Secondly, the intra-group distributions are specified so as to conform to the different socio-economic characteristics of the groups. Thus, for example, as will be seen subsequently the characteristics displayed by rural landless households contrast markedly with those of large landowner households and yield significantly different distributions. Thirdly we postulate a poverty line based on a unique and constant basket of basic needs commodities. Since commodity prices are endogenously determined within the model the monetary value of the poverty line is also endogenously determined. These three innovations help shed more light on the black box pertaining to the behavior of poverty following a shock.

In the next section, we discuss the income distribution and poverty measures used in this paper. The third section is devoted to the presentation of the general equilibrium model used in this study. Section 4 analyzes the impact on poverty of two different

archetype African economy. The last section is devoted to some conclusions.

2.2 Income Distribution, Poverty and Poverty Measurement

In this illustrative case and consistent with the SAM (given in Table 3), we aggregate the households into 6 groups representative of those living in an archetype African country. The groups are defined as follow: (i) rural households (i.e. the landless), (ii) small landowner households, (iii) large landowner households, (iv) urban low-education households, (v) urban high-education households and (vi) capitalist households. To each of these groups we attribute income and demographic characteristics typical of an African economy. These descriptive data are presented in Table 8. As we can observe, the mean income varies from 13.57 for the rural households to 117.72 for the capitalist households. As for the population shares, the small landowner category is the largest group with 36.1% of the total population. In this example the rural households have the highest headcount ratio with 93.3% of its population below the poverty line, followed by the urban low-education category with 57.7%. It should be noted that in the great majority of developing countries detailed income and expenditure survey data exist from which the actual intra-group income distributions can be derived.

Table 8: Income and Demographic Characteristics

	Rural households	Small landowner households	Large landowner households	Urban low-education households	Urban high-education households	Capitalist households
mean income	13.57	27.75	29.91	23.27	41.49	117.72
maximum income	40.0	50.0	55.0	40.0	60.0	140.0
minimum income	5.0	10.0	15.0	15.0	20.0	25.0
population share	0.13	0.31	0.25	0.17	0.10	0.04
% below the poverty line	93.3%	36.1%	19.4%	57.7%	0.5%	0%

In order to analyze and derive poverty by household group, we propose an income distribution formulation corresponding to the characteristics of each household group. This distribution will depend on the minimum and maximum incomes and on the skewness of the income distribution[6]. To represent these characteristics into our income distributions, we use the Beta distribution function (equation 2.1). Parameters *mx* and *mn* are, respectively, the maximum and minimum incomes within a group. As for the parameters p and q, they influence the shape and the skewness of the distribution.

$$I(y; p,q) = \frac{1}{B(p,q)} \frac{(y-mn)^{p-1}(mx-y)^{q-1}}{(mx-mn)^{p+q-1}}$$

$$\text{where, } B(p,q) = \int_{mn}^{mx} \frac{(y-mn)^{p-1}(mx-y)^{q-1}}{(mx-mn)^{p+q-1}} dy \qquad (2.1)$$

Unlike the lognormal, the Beta function is much more flexible when it comes to the asymmetric forms it can adopt. Contrary to the lognormal, the Beta function can be skewed to the left or to the right and be symmetric. If $p \rangle q$, the distribution is skewed to the left. The mode is situated on the left side of the distribution. As the inequality between p and q increases, the distribution tends to be more leftward skewed. If $q \rangle p$, the distribution becomes skewed to the right. Again, the asymmetry accentuates as the inequality increases. If $q = p$, the function becomes symmetric. These three conditions are true only if the values taken by q and p are larger than unity.[7]

In Table 9, the parameters assigned to each household category are presented. In each case, we have chosen the parameters so that the income distribution concords with the characteristics of the households groups described in Table 1.[8] The income distributions generated from these parameters are presented in Figures 3a to 3f.

Table 9: Parameters for the Beta Distribution Function

	Rural households	Small landowner households	Large landowner households	Urban low-education households	Urban high-education households	Capitalist households
p	1.3	2.0	3.0	1.8	3.3	6.0
q	4.0	2.5	5.0	3.5	3.0	1.5
mx	40.0	50.0	55.0	40.0	60.0	140.0
mn	5.0	10.0	15.0	15.0	20.0	25.0

[6] A left skewed distribution can be illustrated as the mode being inferior to the median. A right skewed distribution is when the mode is superior to the median.

[7] The Beta can also represent a bi-modal distribution. This is the case when p and $q \langle 1$. For other possibilities of the value taken by p and q, the interested reader is invited to consult chapter 14 in Johnson, and Kotz (1970).

[8] In an applied study based on survey data, parameters p and q should be estimated and *mx* and *mn* would represent the maximum and minimum incomes within each household category in the survey.

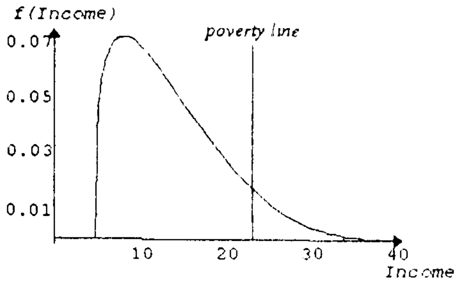


Figure 3a : Income distribution rural households

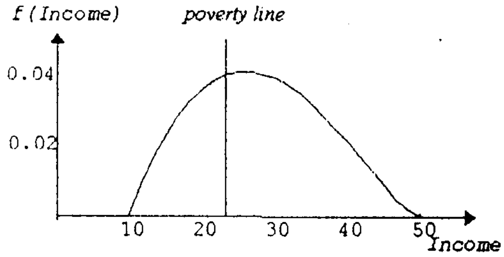


Figure 3b : Income distribution small landowner households

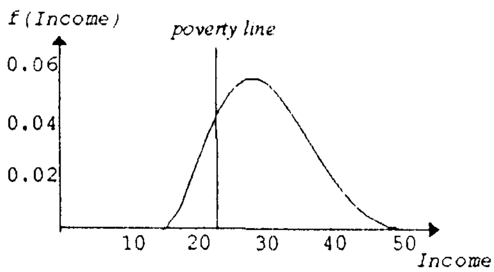


Figure 3c : Income distribution large landowner households

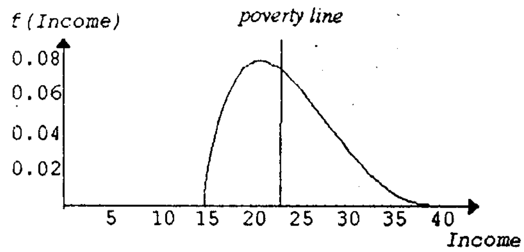


Figure 3d : Income distribution urban low education households

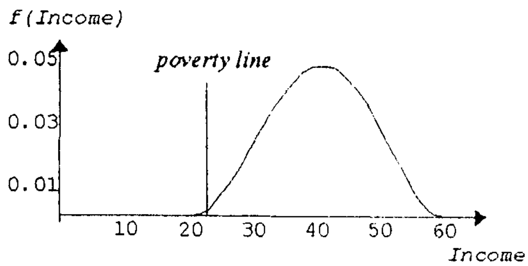


Figure 3e : Income distribution urban high education households

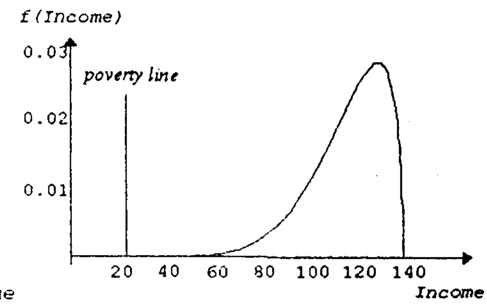


Figure 3f : Income distribution capitalist households

The above distributions will be used to evaluate the poverty incidence within each group in a general equilibrium framework. Following an external shock on the economy, we assume—albeit arbitrarily—that the intra-group distributions shift proportionally with the change in the mean income (as in previous studies, we consider the variance of each distribution exogenous to the model). Since we are not aware of how the increase (decrease) of income is distributed—i.e. if the increase (decrease) in the mean income is of the result an increase (decrease) in the income of the poorest or an increase (decrease) in the income of the richest—we distribute the gain (loss) to all the household within the group. If the mean income increases by ψ, the income of each households within a group is raised by ψ.[9] With the above rule, the income distribution will proportionally shift horizontally following a change in income. Although there are recorded cases of significant changes in intra-group distributions following a shock as in the case of Indonesia's adjustment process between 1984 and 1987 (see Huppie and Ravallion, 1991), more recent work by Ravallion and Chen (1997) finds that inequality increases as often as it falls during spells of growth in developing countries and that neutrality is actually a defensible first-order approximation. However, it is unlikely that distribution neutrality can be assumed to prevail following shocks leading to negative growth, (such as the Asian Financial Crisis) and it is unclear even in spells of growth, whether distribution neutrality would be a good first-order approximation in estimating poverty as opposed to inequality. As stressed by Dervis, De Melo and Robinson (1982), the complete endogenization of intra-group income distributions following shocks still remains the biggest challenge in studying income distribution in a general equilibrium context.

The procedure described above allows us to compare the poverty levels obtaining in the post-simulation case with those prevailing in the pre-simulation case using Foster, Greer and Thorbecke'(F-G-T) P_α measures. The FGT P_α class of additively decomposable poverty measures allows us to measure the proportion of poor in the population (the headcount ratio) but also the depth and severity of poverty. The P_α

measure expressed in terms of the Beta distribution given in equation (2.1) becomes:

$$P_\alpha = \int_{mn}^{z} \left(\frac{z-y}{z} \right)^{\alpha} I(y; p, q)\,dy \qquad (2.2)$$

where α is a poverty-aversion parameter, z is the poverty line and mn the minimum (intra-group) income and p and q parameters of the Beta function as defined earlier.

When $\alpha = 0$, the headcount ratio is derived from equation (2.2). In this case, the P_α yields the proportion of the population within a group below the poverty line. With $\alpha = 1$, the relative importance accorded to all individuals below the poverty line is proportional to their incomes and we have the income poverty gap. As α increases, more importance is given to the shortfalls of the poorest households and the measure becomes more distributionally-sensitive; society becomes more averse to poverty. In this illustrative study, we set $\alpha = 2$ to interpret this last case which assumes that each poor household is assigned a weight equal to its shortfall from the poverty line.

We can summarize the three types of measures derived from the P_α class with the help of Figure 4 which shows how the relationship between individual poverty and the

[9] Note that this implies that within a given group the poorer the households the greater their relative income gain in the case of an increase in group average income and the greater their relative income loss in the case of a drop in mean-income.

standard of living varies across the different values of α (Ravallion,1994). Figure 4 depicts the P_α measure in relation to income for one individual. For P_0, the relation with income is constant. The measure accords the same weight to the richest of the poor as it does to the poorest of the poor. Thus, the sum of each individual's P_0 is simply the headcount ratio. The second measure, P_1, has a linear and decreasing relation with income. Since the income gap (income - poverty line) grows larger, more importance is given to the poorest and less to the richest in the poverty measure. The last measure quantifies the aversion of the society towards poverty: P_2 is strictly convex in income. This implies that the increase in "our measured poverty due to a fall in the standard of living will be greater the poorer you are" (Ravallion, 1994, p. 48).

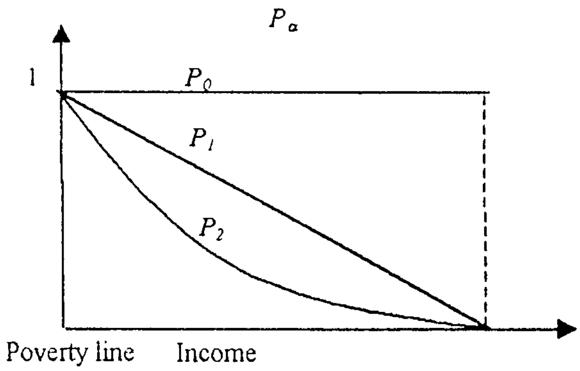


Figure 4 Individual Poverty Measures (source: Ravallion, 1994)

The poverty line itself (z in equation 2.2) is determined endogenously within the CGE model. We postulate that the poverty line is determined by a basket of quantities of commodities reflecting basic needs (BN) consistent with Ravallion's (1994) approach to estimating absolute poverty. We denote this basket as ϖ^{P}_{com} . This basket remains invariant from one simulation to another and applies to <u>all</u> households regardless of group membership. In turn the monetary poverty line is obtained by multiplying the BN commodity basket by their respective prices (Pq_{com}) and aggregating across commodities:

Monetary Poverty Line: $\sum_{com} \varpi^{P}_{com} \, Pq_{com}$

Since commodity prices are endogenously determined within the model, so is the nominal value of this basket, i.e. the poverty line. If commodity prices rise following an external shock, the poverty line will increase (shift to the right) and poverty will rise <u>ceteris paribus</u>.

The demand system which is specified in our model is based on the Linear Expenditure System (LES):

$$C_{h,com} = \frac{Pq\,\varpi_{com} + \beta^{c}_{h,com}\left(CH_h - \sum_{com} \varpi_{com} Pq_{com}\right)}{Pq_{com}}$$

(2.3=28 in App. A)

where $C_{h,com}$ is the demand for commodity com by household group h;
$\varpi_{h,com}$ is the basket of committed (minimal) consumption in volume terms for the commodities specific to household group h;
C_h is disposable income of household group h;
Pq_{com} is the price of com; and
$\sum_{com} \varpi_{h,com} Pq_{com}$ is the monetary value of the committed (minimum)consumption specific to household group h.

This demand system implies that each socio-economic group has its own perception of the minimal commodity basket that it needs to satisfy, consistent with the socioeconomic characteristics and the overall standard of living of the group. Clearly, this minimum basket is bound to be different for the high income capitalist group than the low income rural households. Hence the first term on the right hand side in the numerator of equation (2.3) represents the amount needed to satisfy this household-specific minimum consumption requirements of commodity com. In turn, the second term in the numerator represents the proportions or marginal expenditure propensities $\left(\beta_{h,com}\right)$ of discretionary income $\left(CH_h - \sum_{com} \varpi_{h,com} Pq_{com}\right)$ to be spent on each respective commodity. It can be seen that if this last term is zero (i.e. there is no discretionary income) each household group consumes a quantity of each commodity corresponding exactly to its household-specific postulated minimum.

It is essential to grasp clearly the distinction between the poverty BN basket that applies to all households – regardless of group membership – and is defined at the level of the society; and the LES demand system that specifies a group-specific consumption level for each commodity that is intractable downward. Each group is assumed to behave lexicographically in such a way that it first satisfies its minimum consumption of the respective commodities.

2.3 A General Equilibrium Model of an Archetype of Developing Country

The general equilibrium model presented here is inspired by the framework of the Decaluwé et al. (1995) models which in turn follows the guidelines put forward by the Shoven and Whalley models (1972, 1984). This model represents a small open economy characterizing a developing country that has no influence on the international markets.

The model is described as a six sector model (traditional agriculture, export crop, mining, industry, service and administrative service). The import competing sectors are industry and traditional agriculture. The export sectors are represented by mining and export crops. Land, agricultural capital, capital, unskilled labor and skilled labor are the five primary factors of production employed by the activities. As mentioned in the first part of the paper, households are aggregated into six groups (rural households, small landowner households, large landowner households, urban low-education households, urban high-education households and capitalist households). The geographical location of a household and the origin of their income or occupation and other socio-economic characteristics define the groups. For example, a rural household has the characteristics of living in rural areas and being endowed exclusively with unskilled labour (and thus being landless). The full model is given in Appendix A, and described below.

Production and employment

The multilevel cascading specification of the production process is shown graphically in Figure 5. Production activities are broken down into two agricultural activities and four non-agricultural activities. At the highest level of aggregation there are two aggregate inputs, i.e. value added (*VA*) and intermediate inputs (*ICJ*) which combine in fixed proportions (Leontief function) to produce sectoral output (*XS*). At the next level of aggregation value added (*VA*) is a *CES* function of composite labor (*LD*) and composite capital (*KD*) for the non-agricultural activities and composite labor (*LD*) and composite agricultural capital (*KT*) for the two agricultural sectors. Finally at the lowest level of aggregation composite labor is a *CES* function of skilled labor (*LQ*) and unskilled labor (*LNQ*) and composite agricultural capital is derived from a Cobb-Douglas function combining agricultural capital (*KD*) and land. Thus, the industrial activities (industry and mining) and service activities (services and administrative services) have a slightly different value-added structure than that characterizing agriculture.

This hierarchical multi-level and nested specification allows substitution among primary factors (different labor skill categories and different types of capital in the case of agricultural activities) in the production of the respective activities in response to changes in the relative prices of the factors. The extent of substitutability depends on the magnitude of the respective elasticities of substitution. The production block of the model is given in equations 1-17 in Appendix A.

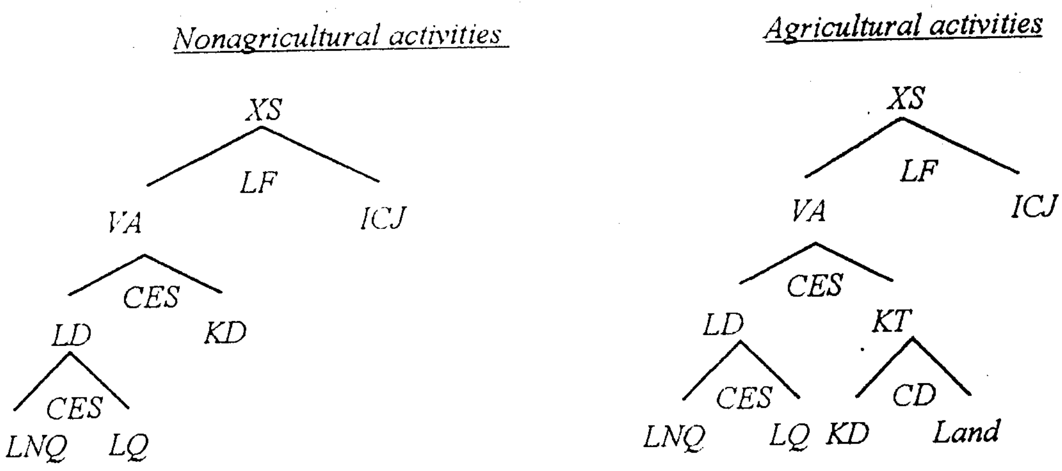


Figure 5: Multilevel Production System

Labor Market

There are two labor markets for skilled and unskilled workers, respectively. Total supply of these two skill groups is given exogenously and full employment is assumed to prevail. The wage rates for the two labor skills are endogenously determined so as to equate labor supply to labor demand. Labor is assumed to be mobile among the different production activities.[10]

Incomes and Savings

The households receive their income from primary factor payments and transfers from the government. From this income, we can derive the disposable income by subtracting the direct taxes collected by the government. Savings and total consumption are then specified as fixed proportions of disposable income. A fixed share of capital and land remuneration determines the firms' income. In turn, firms' savings are a fixed share of their income. Government revenue is generated from direct taxes collected on household income, indirect taxes on domestic goods and taxes levied on imports. Government savings are obtained from the difference between government income and expenditures. In turn, government expenditures consist of transfers made to other agents and public consumption. The income and savings block is given in equations 18-26 of Appendix A.

Demand

The demand system –as described previously - which is adopted here is the Stone-Geary linear expenditure system (LES) which is supposed to reflect the household utility

[10] In further research, the specification of the labor market functioning could allow for sectoral segmentation (e.g. the impact of unions in some sectors) and the possibility of unemployment. Since informal activities are important, these activities, both in the urban and rural areas, can be captured in the base year SAM and the movement of workers between formal and informal activities traced in the model.

functions. As equation 28 in Appendix A (and 2.3 in text) show, a household-specific minimum consumption bundle is postulated where $\varpi_{h,com}$ represents the minimum quantity of each of the five commodities.[11] Multiplying the above basket of commodities by their respective prices yields the committed (i.e. non-discretionary) income for each group.

Total intermediate demand for a given commodity aggregates the input requirements for that commodity by the various production activities (eq. 31). The investment demand for a good is presented as a fixed proportion of total investment (eq. 32).

Foreign Trade

In this model, we follow the Armington (1969) approach by supposing an imperfect substitutability between domestic and imported goods (eq. 45). As for exports, a constant elasticity of transformation characterizes the relative facility of a producer to switch between markets. Following a change in the relative price of domestic and export goods, the producer is able to switch between the domestic and export markets to a degree expressed by the elasticity of transformation (eq. 44). The exogenous current account balance representing the flow of foreign savings (eq. 47) is presented as the difference between the import value and export value.[12]

Equilibrium Conditions

Three equilibrium conditions are respected in the model. The first condition implies the equilibrium between the demand for primary factors and its supply, namely one market for skilled labor, one for unskilled labor and one for agricultural capital. There is no market clearing condition for non-agricultural capital since it is immobile The second condition dictates the equilibrium between total investment and total savings. The third equilibrium condition respects the Walrasian framework. The domestic demand for each good is equal to its corresponding supply.

Closure

Since the economy has no impact on international markets, the world prices of import and export are exogenous to the model. The current account balance and the nominal exchange rate are also exogenous to the model. The predetermined current account balance (i.e. foreign savings) has to equal the import surplus (eq. 47). Furthermore, government consumption and its transfers to households are exogenous. As last closure condition, the primary factor supplies are all exogenous to the model. In this model, both types of labor and agricultural capital are mobile between sectors. Land and capital are specific to each production activity. From Appendix A it can be seen that the

[11] The minimum consumption of a good by a given -household group has been derived using the Frisch parameter and the income elasticity. For a detailled presentation, the interested reader is invited to consult Dervis, De Melo and Robinson (1982).

[12] In this archetype economy, there are no transfers coming from or going to the rest of the world.

model is just identified containing as many endogenous variables as (independent) equations (i.e.223).

2.4 Simulation Results

Two simulations are performed on the model's base year equilibrium. The first is a reduction in the world price of the agricultural export crop on the international market and the second is an import tariff reform. The results of these two simulations are summarized in Tables 10 and 11. In what follows, we discuss the effects of these simulations on the whole socio-economic system and how they ultimately affect the household income distribution and poverty based on the P_α measures.

Simulation 1: Fall in World Price of Export Crop.

The first simulation consists of implementing a 30% fall in the world price of the agricultural export crop. This reduction has a direct repercussion on the exports of agricultural sector. Real output of this sector declines by 35.75%. The primary factors (i.e. skilled and unskilled labor) employed by this sector during the base run are now reallocated to other activities. Consequently, this reallocation increases the production of the other sectors. However, the nominal GDP at factor price falls by 5.88% and the real GDP decreases only marginally by 0.23%. This fall is linked to the decrease in the primary factor prices. In the case of agricultural land, the factor price drops by 55.80%. Land being the primary factor used intensively in agricultural production, a shock on this sector depresses the rate of return on land. This effect is amplified by the constraint that land is specific to each agricultural activity. No reallocation is allowed for this factor, only the rate of return adjusts to the shock. The return on agricultural capital also falls considerably following a decrease in the world price of the export crop (-18.62%). With regard to the other two mobile primary factors, the wages of the unskilled and skilled labor also fall by 6.56% and 3.83%, respectively. Since unskilled labour represents 39% of the value added in export agriculture versus 5% for skilled labour, the variation in the first matters most. However, the effects on wages are attenuated by the mobility of the two types of labour among sectors. Because of the assumption of full employment in the two labor markets the workers released from export agriculture are absorbed in other activities.

The drop in factor prices translates directly into a fall in household nominal income. As we can observe in table 11, the mean nominal income of each household group decreases. The two household categories affected the most by the shock are the small and large landowner households with a fall in their incomes of 6.93% and 6.91%, respectively. This is a consequence of the drastic drop in the rate of return on land and agricultural capital—endowment of these two factors representing 34.3% of the small land owners household income and 78.7% of the large landowners household income.

Table 10: Simulation Results

Variables	Base Level	Simulation 1 : 30% decrease in the world price of export of agricultural crop (% change from base)	Simulation 2 : 50% decrease in import tariff (% change from base)
$GDP\ nominal$	4462.30	-5.88	-1.56
$GDPreal$	4462.30	-0.230	0.551
$Xs_{agriculture}$	1219.50	3.289	-1.034
$Xs_{export\ agriculture}$	281.00	-35.748	2.70
Xs_{mining}	1042.40	2.243	2.70
$Xs_{industry}$	2330.10	0.567	-1.37
$Xs_{service}$	1435.90	1.189	-0.18
$Xs_{administrative\ service}$	594.00	1.170	0.72
Yg	679.00	-5.10	-12.54
$Ydh_{rural\ (nominal)}$	235.60	-6.03	-1.21
$Ydh_{small\ landowner(nominal)}$	1142.60	-6.93	-1.46
$Ydh_{large\ landowner\ (nominal)}$	968.80	-6.91	-1.69
$Ydh_{urban\ low\ income(nominal)}$	504.50	-5.94	-1.31
$Ydh_{urban\ high\ income(nominal)}$	539.50	-4.09	-1.67
$Ydh_{capitalist\ (nominal)}$	639.20	-4.14	-1.65
$Ex_{agriculture}$	181.20	9.94	1.96
$Ex_{export\ agriculture}$	231.00	-37.97	3.24
Ex_{mining}	535.00	5.87	2.27
$Ex_{industry}$	195.00	6.36	2.47
$Ex_{service}$	110.00	6.45	1.75
$M_{agriculture}$	759.80	-5.20	0.62
$M_{industry}$	296.60	-5.94	8.66
$M_{service}$	100.00	-4.67	-0.49
$LQ_{agriculture}$	2.250	0.513	-1.481
$LQ_{export\ agriculture}$	5.000	-56.789	5.128
LQ_{mining}	72.300	5.217	-3.435
$LQ_{industry}$	53.900	-1.080	-0.141
$LQ_{service}$	48.850	0.521	2.088
$LQ_{administrative\ service}$	101.100	-0.610	1.302
$LNQ_{agriculture}$	487.333	3.744	-1.892
$LNQ_{export\ agriculture}$	108.000	-55.400	4.690
$LNQ_{industry}$	51.333	8.600	-3.837
LNQ_{mining}	632.267	2.100	-0.557
$LNQ_{service}$	390.933	3.752	1.663
$LNQ_{administrative\ service}$	357.067	2.585	0.880
$Pm_{service}$	1.00	-	-
$Pq_{agriculture}$	1.06	-3.65	-4.01
$Pq_{export\ agriculture}$	1.11	-18.08	-2.71
Pq_{mining}	1.08	-6.54	-6.80
$Pq_{industry}$	1.07	-4.65	-3.71
$Pq_{service}$	1.06	-4.77	-1.07
wq	2.00	-3.83	-1.69
wnq	0.75	-6.56	-1.31
Ra	1.00	-18.62	-1.26
$rt_{agriculture}$	1.00	-3.13	-3.04
$rt_{export\ agriculture}$	1.00	-55.80	2.99
r_{mining}	1.00	0.72	-4.76
$r_{industry}$	1.00	-4.78	-1.81
$r_{service}$	1.00	-3.38	0.18
$r_{administrative\ service}$	1.00	-4.37	-0.52

As for the rural household and the urban low-education households, the decline in their nominal income is mainly a consequence of the reduction in the unskilled wage rate since the share of their total income originating from unskilled labour salary represents 91.9% and 80.2% of total income, respectively. The earnings of the urban high-education households and the capitalist households also fall by 4.09% and 4.14%, respectively.

The decline in each household category's nominal mean income is presented by a horizontal shift to the left of the income distribution—as shown in Figures 6a through 6f.

Figure 6a-6f: Effect of a 30% reduction in the world export price of the export agriculture crop on income distribution

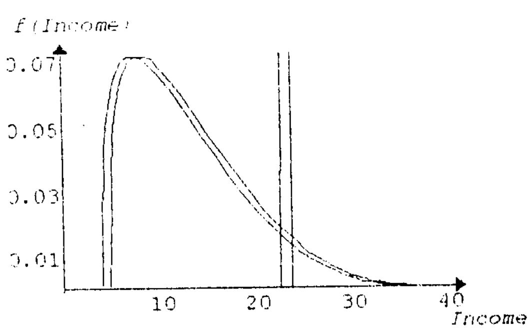


Figure 6a : Income distribution rural households

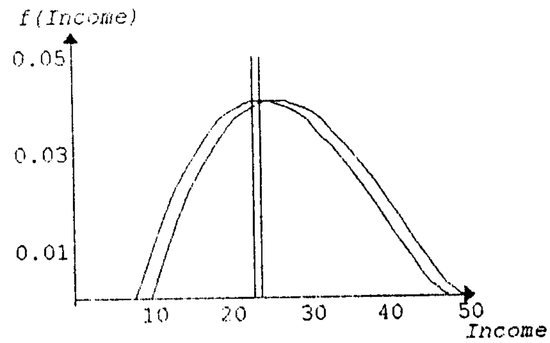


Figure 6b : Income distribution small landowner households

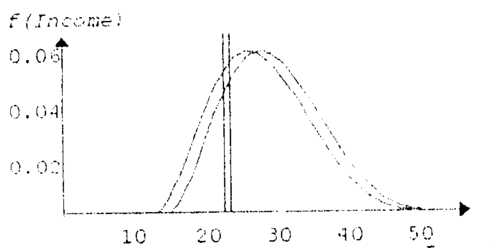


Figure 6c : Income distribution large landowner households

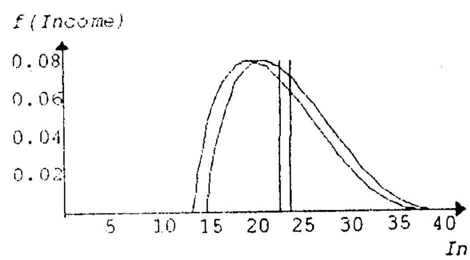
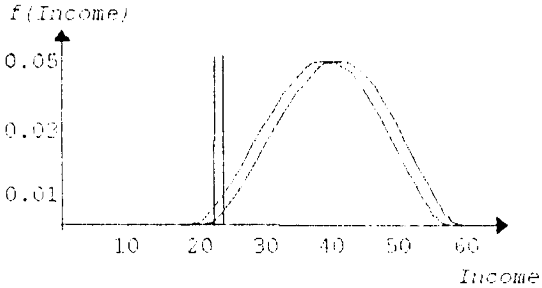


Figure 6d : Income distribution urban low education households



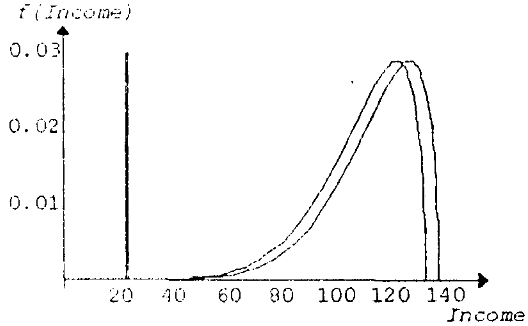


Figure 6e : Income distribution urban high education households **figure 6f** : Income distribution capitalist households

Since the prices of the commodities are endogenously determined so is the new monetary poverty line

$$\text{i.e.} \qquad \sum_{com} \varpi_{com}^{P} \, Pq_{com}$$

Hence in Figures 6a-6f the new post simulation poverty line is drawn next to the pre-simulation line. The changes in the poverty line are presented in Table 11 (see bottom panel). For the first simulation the poverty line decreases by 4.4%. This reduction is the consequence of a fall in the consumption prices of the basket of basic needs, which determines the poverty line. With the post-simulation distribution and a new poverty line, we can use the P_α class to estimate the effects on poverty.

The headcount ratio (P_0) increases for all household groups—except the rural households. Rural households display, by far, the highest headcount ratio with 92.9% of the population below the poverty line. Compared with the base year, this represents a 0.4% improvement in the headcount ratio. Rural households constitute the only group enjoying a reduction in poverty. This is explained by the poverty line reduction which dominates the reduction in nominal income of this specific household group. We find the highest relative increase in P_0 among the urban high-education households--this ratio increasing from 0.5% to 0.8% following the fall in the price of the export crop.

Table 11. Poverty Measures for the Base Year and Simulations

		Rural House-holds	Small Landowner Households	Large Landowner Households	Urban Low-Education Households	Urban High-Education Households	Capitalist Households	P_{α}^{social}
alpha=0	base	0,933	0,361	0,194	0,577	0,005	0	0,380
	Simulation 1	0,929	0,396	0,245	0,600	0,008	0	0,407
		(-0,4%)	(9,7%)	(26,4%)	(4,0%)	(60,0%)	-	(7,2%)
	Simulation 2	0,923	0,348	0,183	0,546	0,005*	0	0,367
		-1,0%	-3,7%	-5,4%	-5,3%	-3,1%	-	-3,4%
alpha=1	base	0,443	0,078	0,021	0,093	0,00019	0	0,104
	Simulation 1	0,454	0,096	0,032	0,106	0,00038	0	0,116
		2,5%	22,9%	50,3%	13,7%	95,6%	-	11,4%
	Simulation 2	0,434	0,076	0,020	0,086	0,00019*	0	0,100
		-2,0%	-3,3%	-5,2%	-7,8%	-1,1%	-	-13,2%
alpha=2	base	0,249	0,024	0,004	0,020	0,00001	0	0,045
	Simulation 1	0,263	0,033	0,006	0,025	0,00003	0	0,051
		5,7%	37,1%	77,2%	23,7%	138,6%	-	13,8%
	Simulation 2	0,243	0,024	0,003	0,018	0,00001*	0	0,043
		-2,4%	-2,8%	-4,9%	-9,8%	1,0%	-	-3,1%
Mean Income	base	13,6	27,8	29,9	23,3	41,5	117,7	
	Simulation 1	12,7	25,8	27,8	21,9	39,8	112,9	
		-6,0%	-6,9%	-6,9%	-5,9%	-4,1%	-4,1%	
	Simulation 2	13,4	27,3	29,4	23,0	40,8	115,8	
		-1,2%	-1,5%	-1,7%	-1,3%	-1,7%	-1,7%	
Poverty Line	base	24,0	24,0	24,0	24,0	24,0	24,0	
	Simulation 1	23,0	23,0	23,0	23,0	23,0	23,0	
		-4,4%	-4,4%	-4,4%	-4,4%	-4,4%	-4,4%	
	Simulation 2	23,3	23,3	23,3	23,3	23,3	23,3	
		-3,0%	-3,0%	-3,0%	-3,0%	-3,0%	-3,0%	

*Results are identical to the base year data due to rounding of the figures

As opposed to the headcount measure, the poverty gap increases for all households. The rural households display the smallest relative increase in the income gap measure (2.5%) of all the household groups.

The same holds true for P_2, the rural households reveal the smallest relative increase and the urban high-income households the highest.

In Table 11, an aggregate societal poverty corresponding to each of the three classes of P_{α}'s is presented. These social poverty measures are the weighted sums of the households' P_{α}'s i.e. where $P_{\alpha}^{social} = \sum_{h} n_h P_{\alpha}^{household}$, where n_h is the household population share in the total population. As we can clearly observe the societal poverty measures of the three classes rise with a decline in the world price of the country's export crop.

In most cases above the effects pertaining to the downward shift in the poverty line do not counter balance (compensate for) the negative nominal mean income effect.

The only case for which the downward shift in the poverty line is proportionally greater than the income effect is the P_0 of the rural households. Only in this case does poverty fall following the negative trade shock.

Simulation 2: Import Tariff Reform

The second simulation consists of implementing a 50% reduction in import tariffs on all imports. This policy reduces the domestic price of imports competing with the traditional agriculture (-5.06%) and the industrial (-10.01%) sectors.[13] With a fall in the import price, the agents substitute domestic products for imported goods. This in turn leads to a decline in the consumption price of the domestically produced goods originating in the protected traditional agriculture and industrial sectors. The fall in the demand for these two domestically produced goods and the increased competition redirects some of the output towards the export market. Exports of traditional agricultural increase by 1.96% and the exports of the industrial branch by 2.47%. Since increased exports did not completely compensate for the fall in the domestic demand, output of these activities falls by 1.03% and 1.37%, respectively. The resources released by this fall in total output in traditional agriculture and industry move to other more efficient activities except for the mining sector. The latter undergoes a slight reduction in output (1.37%) as a consequence of the combined fall of the intermediate demand for the mining product coming from the industrial production and the investment demand for the mining product.

With the fall in almost all of the primary factor prices, the nominal GDP at factor cost decreases by 1.56% but real GDP increases marginally by .55%. The fall in the factor prices also has a negative effect on the households' nominal incomes. The large landowner households suffer the largest decrease in mean income (1.69%) and the rural households suffer the least decrease (1.21%).

As in the first simulation, the post-simulation income distributions are plotted and compared to the base distributions in figures 7a to 7f. Again, the fall in the consumption price of all the goods reduces the poverty line (which shifts to the left). The corresponding new poverty levels are presented in Table 11.

In this simulation all headcount ratios, improve following a fall in the import tariff (capitalist households display no poverty under either regime). Thus, the shift in the monetary poverty line more than compensates for the fall in mean incomes. With a P_0 of 0.0183, the large landowner households undergo the highest relative decrease in poverty with a fall of 5.4% (of course, the absolute change is small). The smallest relative fall of the P_0 measure is ascribed to the rural households (1.0%).

As with the headcount ratio, the poverty gap measure falls for all households. However, these improvements are relatively less important for the rural households and

[13] One could imagine that the government was protecting a key domestic food crop (e.g. rice) and following a strategy of import substitution industrialization.

the urban high-income households (-1.1%) than for the urban low-education households (-7.8%).

All household categories except the urban high-income group benefit from an alleviation of poverty when measured with P_2. The poverty level for the urban high-education group rises by 1.0% while the urban low-education group has the largest relative fall in poverty (-9.8%).

As for the social poverty levels presented in Table 6, the headcount ratio and the poverty gap decline by 3.4% and 13.2% respectively. Here, the reductions in import tariffs are beneficial to the alleviation of social poverty. The same is true when society has a greater aversion towards poverty. In this case, the social poverty level declines slightly by -3.1%.

Figure 7a-7f: Effect of a 50% reduction in import tariffs on all imports

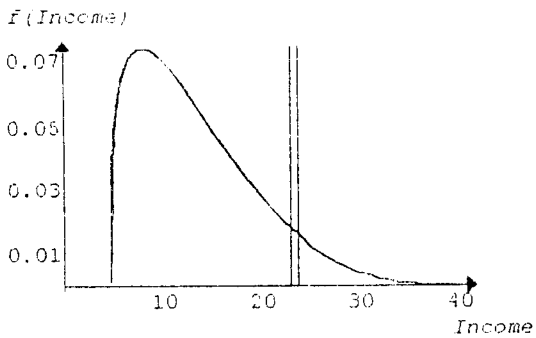


Figure 7a : Income distribution rural households

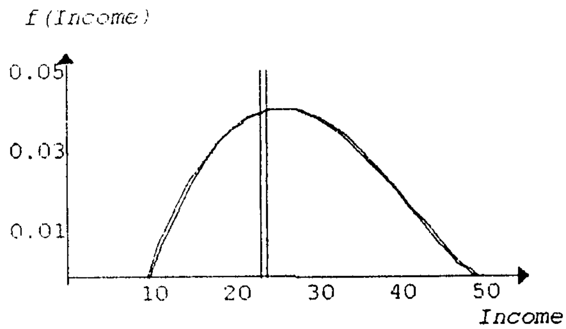


Figure 7b : Income distribution small landowner households

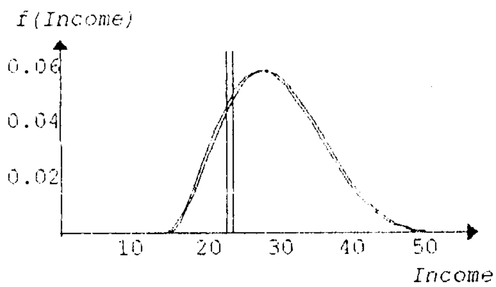


Figure 7c : Income distribution large landowner households

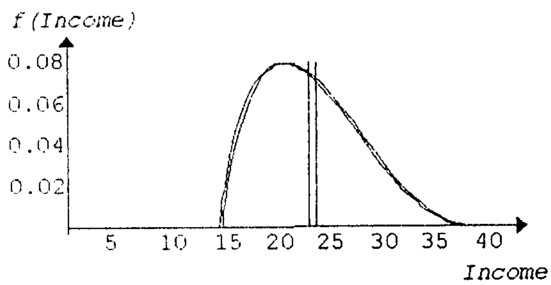


Figure 7d : Income distribution urban low education households

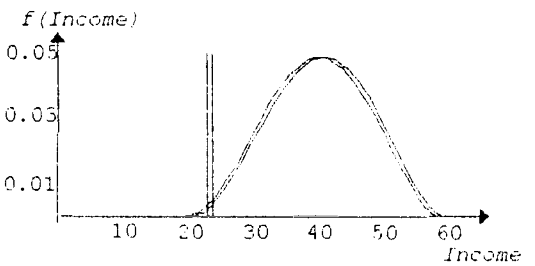


Figure 7e : Income distribution urban high education household

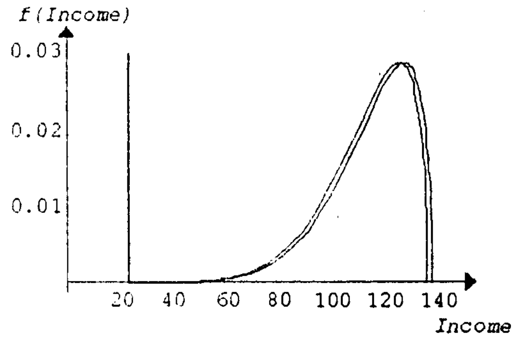


Figure7f : **Income distribution capitalist households**

3. CONCLUSIONS

This paper showed how the analysis of income distribution and poverty can be incorporated into the SAM and CGE methodology. On the basis of a socioeconomic structure reflecting an archetype African economy a corresponding SAM and CGE were built.

The major contribution of this paper is that the model is specified in such a way that the impact of an exogenous shock on poverty can be simulated. The CGE model takes as its point of departure the initial intra-group income distributions for the six different household categories. By postulating a relatively flexible Beta distribution the parameters of that distribution are chosen so as to conform to and reflect the socio-economic characteristics of each household category in the model. The poverty line is defined as the cost of a basket of basic needs commodities. Since the basket itself in quantitative terms remains invariant (consistent with the notion of absolute poverty) and prices are endogenously determined within the model so is the monetary poverty line. The demand system adopted in the CGE model is a variant of the Linear Expenditure System. Demand functions are specified for each socioeconomic household group and for each commodity. The form of these functions is that they contain a subjectively derived minimum commodity basket specific to each household group and reflecting the socioeconomic characteristics of each group and its standard of living and preferences.

Starting with the initial intra-group income distributions the model simulates the effects of two different shocks (a fall in the price of exports and an import tariff reform) on the average income levels of the household groups and assumes that the initial distributions shift horizontally (either to the left or to the right) as mean incomes fall or rise, respectively.

This procedure yields the post simulation within-group income distributions which can then be confronted with the new endogenously derived poverty line to measure the resulting poverty - using the F-G-T additively decomposable class of poverty measures. In this way a comparison can be made of the incidence of poverty in the pre and post simulation situations.

In conclusion, the approach followed in this paper has gone part of the way in endogenizing the effects of exogenous shocks on poverty within a general equilibrium framework. It is hoped that this paper will encourage researchers to analyze and explain more deeply the mechanisms affecting the shape of intra-group income distributions following a shock. A better understanding of those mechanisms would reduce the arbitrariness of assuming - as we do here - that those distributions shift horizontally so that every individual within a household group receives an addition (or, alternatively, a reduction) in income equal to the difference between the post- and pre-simulation average income of that group.

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Appendix A : General Equilibium Model of Archetype African Economy

I. List of Symbols

Indices

Activities:	agr	Agriculture
	agex	Rent agriculture
	min	Mining
	ind	Industry
	ser	Services
	as	Administrative services

Commodities:	agr	Agriculture
	agex	Rent agriculture
	min	Mining
	ind	Industry
	serv	Composite services (as, ser)

Sets:

I	{ agr, agex, min, ind, ser, as }	Production activities
AG	{ agr, agex }	Agricultural activities
IN	{ min, ind, ser, as }	Non-agricultural activities
MER	{ agr, agex, min, ind, ser, }	Exporting activities
COM	{ agr, agex, min, ind, serv }	Commodities

Households:	mrur	Rural households (landless)
	mls	Small agricultural land owners households
	mll	Large agricultural land owners households
	muli	Low income urban households
	muhi	High income urban households
	cap	Capitalist households

H {mrur, mls, mll, muli, muhi, cap}

Parameters

CES Elasticity of substitution of VA	σ_i
CES Substitution parameter of VA	ρ_i
CET Distributive share of VA	δ_i
CES Scale parameter of VA	B_i
CES Elasticity of substitution of LD	σ_i^l
CES Substitution parameter of LD	ρ_i^l
CET Distributive share of LD	δ_i^l
CES Scale parameter of LD	B_i^l

Cobb-Douglas elasticity for KT	α_{ag}
Cobb-Douglas scale parameter for KT	A_{ag}
Cobb-Douglas elasticity for Dserv	α^{d}
Cobb-Douglas scale parameter for Dserv	A^{d}
Share of commodity I in household h consumption	$\beta^{c}_{h,com}$
Basic Poverty Needs basket in quantitative terms	ϖ^{P}_{com}
Minimal consumption (in quantity) of commodity by household group h	$\varpi_{h,com}$
Share of commodity in public consumption	β^{g}_{com}
Household marginal propensity to save	mps_{h}
Share of commodity i in total investment	β^{I}_{com}
Activity i's share in total production	β^{x}_{i}
Household share of capital income	λ^{k}_{h}
Household share of land income	λ^{t}_{h}
Household share of skilled labor income	λ^{q}_{h}
Household share of unskilled labor income	λ^{nq}_{h}
Input-output coefficients	$aij_{com,j}$
Share of value added in total output	v_{i}
Household income tax rate	tyh_{h}
Indirect tax rate	tx_{i}
Import duty rate	tm_{com}
CET scale parameter	B^{T}_{mer}
CET transformation parameter	ρ^{T}_{mer}
CET distributive share	δ^{T}_{mer}
CET elasticity of transformation	σ^{T}_{mer}
CES scale parameter	B^{S}_{com}
CES substitution parameter	ρ^{S}_{com}
CES distributive share	δ^{S}_{com}
CES elasticity of substitution	σ^{S}_{com}

Endogenous Variables

PRICE

Wage rate	w_i
Skilled wage rate	wq
Unskilled wage rate	wnq
Value added price	Pva_i
Producer price	P_i
Rate of return on capital	r_{in}
Rate of return on agricultural capital	ra
Rate of return on land	rt_{ag}
Price of composite capital	Pk_{ag}
Price of commodities and services	Pd_{i+serv}
Price of composite commodities	Pq_{com}
Domestic price of imports	Pm_{com}
Domestic price of exports	Pe_{mer}
Producer price index	$Pindex$

PRODUCTION

Value added	VA_i
Total production by activity	XS_i

FACTORS

Agricultural composite capital	KT_{ag}
Agricultural capital demand	KD_{ag}
Skilled labor demand	LQ_i
Unskilled labor demand	LNQ_i
Composite labor demand	

DEMAND

Total household consumption	CH_h
Household h consumption of commodity com	$C_{h,com}$
Total consumption of commodity i	CT_{com}
Total investment	IT
Consumption of commodity i for investment uses	INV_{com}
Intermediate demand of commodity i	$INTD_{com}$
Intermediate consumption of commodity com by activity j	$ICJ_{com,j}$
Imports (cif vol)	M_{com}
Exports (fob vol)	EX_{mer}
Domestic demand for domestically produced commodities	D_{i+serv}
Domestic demand for composite commodities	Q_{com}

INCOME AND SAVING

Total household income	YH_h
Household disposable income	YDH_h
Firm income	YF
Government revenue	YG
Household savings	SH_h
Firm savings	SF
Government savings	SG
Indirect taxes	TXS_i
Revenue from import duties	TXM_{com}

Number of endogenous variables **223**

Exogenous Variables

Unskilled labor supply	$\overline{LSNQ}$
Skilled labor supply	$\overline{LSQ}$
Non agricultural capital by activity	$\overline{KD}_{in}$
Agricultural capital stock	$\overline{KA}$
Land	$\overline{LAND}_{ag}$
Nominal exchange rate	$\bar{e}$
World price of exports (in foreign currency)	$\overline{Pwe}_{com}$
World price of imports (In foreign currency)	$\overline{Pwm}_{com}$
Current account balance	$\overline{CAB}$
Government transfer payments to household	$\overline{TGH}_h$
Public consumption	$\overline{CG}$

II. EQUATIONS

Production

1- $$XS_i = \frac{VA_i}{v_i}$$

2- $$ICJ_{com,j} = aij_{com,j} . XS_j$$

Non-agricultural activities

CES between composite labor and capital

3- $$VA_{in} = B_{in}\left[\delta_{in} KD_{in}^{-\rho_{in}} + (1-\delta_{in}) LD_{in}^{-\rho_{in}}\right]^{-\frac{1}{\rho_{in}}}$$

Labor demand derived from 3.

4- $$LD_{in} = \left(\frac{VA_{in}}{B_{in}}\right)\left[(1-\delta_{in}) + \delta_{in}\left[\frac{\delta_{in} w_{in}}{(1-\delta_{in}) r_{in}}\right]^{\sigma_{in}-1}\right]^{\left(\frac{1}{\rho_{in}}\right)}$$

CES between skilled and unskilled labor

5- $$LD_{in} = B_{in}^{l}\left[\delta_{in}^{l} LNQ_{in}^{-\rho_{in}^{l}} + \left(1-\delta_{in}^{l}\right) LQ_{in}^{-\rho_{in}^{l}}\right]^{-\frac{1}{\rho_{in}^{l}}}$$

Labor demand derived from 5.

6- $$LQ_{in} = \left(\frac{LD_{in}}{B_{in}^{l}}\right)\left[\left(1-\delta_{in}^{l}\right) + \delta_{in}^{l}\left[\frac{\delta_{in}^{l} wq}{\left(1-\delta_{in}^{l}\right) wnq}\right]^{\sigma_{in}^{l}-1}\right]^{\left(\frac{1}{\rho_{in}^{l}}\right)}$$

Factor prices

7- $$r_{in} = \frac{Pva_{in} VA_{in} - w_{in} LD_{in}}{KD_{in}}$$

8- $$w_{in} = \frac{wq LQ_{in} + wnq LNQ_{in}}{LD_{in}}$$

Agricultural activities

CES between composite labor and capital

9- $$VA_{ag} = B_{ag}\left[\delta_{ag} KT_{ag}^{-\rho} + \left(1-\delta_{ag}\right) LD_{ag}^{-\rho_{ag}}\right]^{-\left(\frac{1}{\rho_{ag}}\right)}$$

Composite labor demand derived from 9

10- $$LD_{ag} = \left(\frac{VA_{ag}}{B}\right)\left[\left(1-\delta_{ag}\right) + \delta_{ag}\left[\frac{\delta_{ag} w_{ag}}{\left(1-\delta_{ag}\right) Pk_{ag}}\right]^{\sigma_{ag}-1}\right]^{\left(\frac{1}{\rho_{ag}}\right)}$$

C-D between agricultural capital and land

11-

$$KT_{ag} = A_{ag} KD_{ag}^{\alpha_{ag}} \overline{LAND}_{ag}^{1-\alpha_{ag}}$$

Agricultural capital derived from 11.

12-

$$KD_{ag} = \frac{\alpha_{ag} Pk_{ag} KT_{ag}}{ra}$$

CES between skilled and unskilled labofootnoter

13-

$$LD_{ag} = B_{ag}^{l} \left[\delta_{ag}^{l} LNQ_{ag}^{-\rho_{ag}^{l}} + \left(1-\delta_{ag}^{l}\right) LQ_{ag}^{-\rho_{ag}^{l}} \right]^{-\frac{1}{\rho_{ag}^{l}}}$$

14-

$$LQ_{ag} = \left(\frac{LD_{ag}}{B_{ag}^{l}} \right) \left[\left(1-\delta_{ag}^{l}\right) + \delta_{ag}^{l} \left[\frac{\delta_{ag}^{l} wq}{\left(1-\delta_{ag}^{l}\right) wnq} \right]^{\sigma_{ag}^{l}-1} \right]^{\left(\frac{1}{\rho_{ag}^{l}}\right)}$$

Factor prices

15-

$$Pk_{ag} = \frac{Pva_{ag} VA_{ag} - w_{ag} LD_{ag}}{KT_{ag}}$$

16-

$$rt_{ag} = \frac{Pk_{ag} KT_{ag} - raKD_{ag}}{LAND_{ag}}$$

17-

$$w_{ag} = \frac{wnqLNQ_{ag} + wqLQ_{ag}}{LD_{ag}}$$

Income and Savings

18-

$$YH_h = wnq\lambda_h^{nq} \sum_i LNQ_i + wq\lambda_h^{q} \sum_i LQ_i + \lambda_h^{k} \left(\sum_{in} r_{in} KD_{in} + ra \sum_{ag} KD_{ag} \right)$$

$$+ \lambda_h^{t} \sum_{ag} rt_{ag} \overline{LAND}_{ag} + \overline{TGH}_h$$

19-

$$YDH_h = YH_h (1 - tyh_h)$$

20-

$$YF = \left(1 - \sum_h \lambda_h^{k}\right) \left(\sum_{in} r_{in} KD_{in} + ra \sum_{ag} KD_{ag} \right)$$

21-

$$YG = \sum_h tyh_h YH_h + \sum_i TXS_i + \sum_{com} TXM_{com}$$

22-

$$TXS_i = tx_i P_i XS_i$$

23-

$$TXM_{com} = \bar{e}tm_{com} \overline{Pwm}_{com} M_{com}$$

24- $$SH_h = mps_h YDH_h$$

25- $$SF = YF$$

26- $$SG = YG - \sum_h \overline{TGH}_h - \overline{CG}$$

Demand for commodities

27- $$CH_h = YDH_h - SH_h$$

28- $$C_{h,com} = \frac{Pq_{com}\varpi_{h,com} + \beta^c_{h,com}\left(CH_h - \sum_{com}\varpi_{h,com}Pq_{com}\right)}{Pq_{com}}$$

29- $$CT_{com} = \sum_h C_{h,com} + \frac{\beta^g_{com}\overline{CG}}{Pq_{com}}$$

30- $$INTD_{com} = \sum_j ICJ_{com,j}$$

31- $$INV_{com} = \frac{\beta^i_{com} IT}{Pq_{com}}$$

Prices

32- $$Pva_i = \frac{P_i XS_i - \sum_{com} Pq_{com} ICJ_{com,i}}{VA_i}$$

33- $$Pm_{com} = \overline{Pwm}_{com}(1 + tm_{com})\bar{e}$$

34- $$Pe_{mer} = \frac{\overline{Pwe}_{mer}\bar{e}}{(1 + te_{mer})}$$

35- $$Pq_{com} = \frac{Pd_{com}D_{com} + Pm_{com}M_{com}}{Q_{com}}$$

36- $$Pd_{ser} = \frac{Pd_{serv}D_{serv} - Pd_{as}D_{as}}{D_{ser}}$$

37- $$Pd_{as} = (1 + tx_{as})P_{as}$$

38- $$P_{mer} = \frac{Pd_{mer}D_{mer} + Pe_{mer}EX_{mer}}{(1 + tx_{mer})XS_{mer}}$$

39- $$Pindex = \sum_i \beta^x_i P_i$$

Foreign Trade

40- $$XS_{as} = D_{as}$$

41- $$D_{serv} = A^{d} D_{as}^{\alpha^{d}} D_{ser}^{1-\alpha^{d}}$$

42- $$D_{as} = \frac{\alpha^{d} Pd_{serv} D_{serv}}{Pd_{as}}$$

43- $$XS_{mer} = B_{mer}^{T}\left[\delta_{mer}^{T} EX_{mer}^{\rho_{mer}^{T}} + \left(1-\delta_{mer}^{T}\right) D_{mer}^{\rho_{mer}^{T}}\right]^{\frac{1}{\rho_{mer}^{T}}}$$

44- $$EX_{mer} = \left(\frac{Pe_{mer}}{Pd_{mer}}\right)^{\sigma_{mer}^{T}} \left(\frac{\left(1-\delta_{mer}^{T}\right)}{\delta_{mer}^{T}}\right)^{\sigma_{mer}^{T}} D_{mer}$$

45- $$Q_{com} = B_{com}^{S}\left[\delta_{com}^{S} M_{com}^{-\rho_{com}^{S}} + \left(1-\delta_{com}^{S}\right) D_{com}^{-\rho_{com}^{S}}\right]^{-\frac{1}{\rho_{com}^{S}}}$$

46- $$M_{com} = \left(\frac{Pd_{com}}{Pm_{com}}\right)^{\sigma_{com}^{S}} \left(\frac{\delta_{com}^{S}}{\left(1-\delta_{com}^{S}\right)}\right)^{\sigma_{com}^{S}} D_{com}$$

47- $$\overline{CAB} = \sum_{com} \overline{Pwm_{com}} M_{com} - \sum_{mer} \overline{Pwe_{mer}} EX_{mer}$$

Equilibrium conditions

48- $$Q_{com} = CT_{com} + INTD_{com} + INV_{com}$$

49- $$\overline{LSNQ} = \sum_{i} LNQ_{i}$$

50- $$\overline{LSQ} = \sum_{i} LQ_{i}$$

51- $$\overline{KA} = \sum_{ag} KD_{ag}$$

52- $$IT = SF + \sum_{h} SH_{h} + SG + \overline{e}\overline{CAB}$$

Number of independent equations **223**

B. A CGE Framework for Analysing Distributional Consequences of Macroeconomic Policies in Bangladesh: Present Status and Suggested Extensions

A CGE Framework for Analysing Distributional Consequences of Macroeconomic Policies in Bangladesh: Present Status and Suggested Extensions

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A CGE Framework for Analysing Distributional Consequences of Macroeconomic Policies in Bangladesh: Present Status and Suggested Extensions

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Contents

1. Introduction

The low level of income and pervasive poverty in Bangladesh make it imperative for the government to focus on poverty reduction as the central concern of public policy. Despite government efforts and implementation of various programmes targeted to the poor since the early 1970s, the success in poverty reduction has not been significant. Over the past few decades, the economy has not been able to sustain high growth. The low level of growth is also manifested in macroeconomic imbalances in the form of high fiscal deficit, low domestic savings, and sizable external account deficit. As a result, both inflation and interest rates in the past have been high, making the economy highly uncertain and not conducive to accelerated investment.

1.1 Economic reforms and structural adjustments

With slow growth and crisis in macroeconomic management characterizing the economy, the focus of macroeconomic policy since the 1980s has been on adjustments in economic structure per se to generate consistent long-term growth. For this, a comprehensive economic reform programme was launched to open up and establish a liberalized, market-based, and private sector-driven economy. The underlying objective of these efforts, supported by development partners, has been to accelerate economic growth through more efficient allocation of resources and better economic management. Under the programme, considerable success has been achieved in maintaining macroeconomic stability. In particular, inflation was reduced, fiscal and current account deficits were narrowed, stable and market-responsive exchange rate was maintained, and foreign exchange reserves increased. The achievement of macroeconomic stability, however, proved to be necessary but not sufficient for accelerating growth. The achievement of sound macroeconomic fundamentals has not been translated into higher investments and growth, with transition from stability to high growth appearing to emerge as the major challenge. The production and export bases of the economy still remain narrow. Such structural weaknesses and other pervasive bottlenecks limit the economy's capacity to respond and adjust to changes and support higher levels of growth and employment generation needed for sustained poverty reduction.

In order to accelerate economic growth and put the economy to a poverty reduction path, it is necessary to push forward the reform agenda with attention to restoring and maintaining macroeconomic stability, removing distortions in the product and factor markets, and accelerating human resource development. This requires policy and institutional reforms to increase savings and investment, remove infrastructure bottlenecks, develop an efficient financial sector, and enhance agricultural productivity. As for the reform agenda, it is recognized that wide-ranging reforms and structural adjustments are needed in the economy through relaxation of government interventions and other measures in various fields to promote both internal and external competitiveness and adjust to changes in the global economy. In the process, the economy, however, has structural rigidities and constraints for which specific plans and programmes are needed to accelerate growth with poverty reduction.

Although economic adjustments are necessary, there is some evidence that unwarranted impacts of such adjustments arise, especially on the poor and the vulnerable groups. Experience of several countries undertaking adjustment policies suggests that there are differential impacts of these adjustment policies at the household level, and that vulnerable groups of the society bear a disproportionate burden of the adjustment costs (Demery and Addison, 1987; Cornia, Jolly and Stewart, 1987).

1.2 Objectives

The basic objective of the Monitoring Adjustment and Poverty (MAP) Project in Bangladesh is to examine and monitor the impacts of adjustment measures on poverty situation. The project intends to develop appropriate framework to analyse the consequences of macroeconomic and adjustment policies on household welfare and income distribution. Understanding the impact of adjustment policies is important since it helps the policymakers in formulating and implementing countervailing measures that would offset, or at least reduce, the deleterious impact on the poor households. In order to monitor and examine the consequences of adjustment policy, a general equilibrium framework has been developed under the project to examine the impacts on resource allocation, income distribution, growth and poverty reduction, and welfare. In the past, the consequences of adjustment policies (e.g. trade and tax reforms) on reallocation of resources, distribution of income, poverty situation, and on nutrition status of household groups have been examined using the framework and some these were presented in the 3rd MIMAP seminar in Kathmandu in 1998. These have subsequently been compiled in the MAP Technical paper on " Impact of Macroeconomic Policy Reforms in Bangladesh: A General Equilibrium Framework for Analysis". However, gender aspects of these adjustments could not be addressed within the earlier framework mainly due to lack of a relevant data set. Incorporation of female headed households in the household classification and construction of a new SAM for 1993/94 has made it possible to address such concerns within the present framework. Thus one of the major objectives of this paper is to examine the impacts of adjustment programme on welfare of female headed households. Moreover tariff and tax reforms have also been reexamined using the newly calibrated CGE model based on 1993/94 SAM data base. The present paper also presents the proposed future extension of the modeling framework under the MAP Bangladesh project.

The methodology and framework of analysis are discussed in section 2. The results of the simulation experiments are reported in section 3. Finally, the proposed extension of the framework is outlined in section 4.

2. Outline of the methodology

The general methodology has been to use a framework of analysis which allows to examine the consequences of various macro economic policy changes at sectoral and macro levels and to estimate their impact at the household level. To examine the above issues, a computable general equilibrium technique has been employed. A Computable General Equilibrium (CGE) model examines the consequences of policy reforms within a constrained optimization framework. A Social Accounting Matrix (SAM) prepared for the year 1993/94 serves as the consistent and comprehensive data base for the above-mentioned exercises. The framework of analysis, therefore, consists of a CGE model to examine resource allocation and income distribution effects under different trade and tax structures.

2.1 Household classification and accounts

The CGE model is numerically calibrated to a 34 sector SAM constructed for 1993/94. The 34 sector SAM is derived from the original SAM which consists of 79 activities (see Appendix Table A1 for the mapping scheme). In particular, the SAM identifies the economic relations through four types of accounts: (i) production activity accounts for 79 sectors (described in the input – output (I-O) table; (ii) nine factors of production with eight different types of labour and one capital; (iii) current account transactions between four main institutional agents; households and unincorporated capital, corporate enterprises, government and the rest of the world; and (iv) one consolidated capital account to capture the flows of savings and investment by institutions and sectors respectively (for detailed discussion on SAM compilation see MAP Technical Paper 9). An important feature of the SAM for 1993/94 is the decomposition of the households into eight groups. The household groups differ with respect to employment status, income levels and expenditure patterns. Pyatt and Thorbecke (1976) have suggested location, sociological and wealth criteria to classify household groups[1]. However, the classification of households depends on availability of information and the issues that need to be addressed. For example, since information on income levels is readily available, households are seldom classified by level of income. Indeed, grouping of households by income levels is an informative approach to describe income distribution issues at a point in time. However, if the purpose is to provide a basis for diagnosis and policy

[1] For instance, the location criterion which distinguishes a household as urban or rural is useful since it captures many aspects of duality. Depending on this distinction, individuals with otherwise similar characteristics are likely to be paid different wages, have different job opportunities and employment expectations and generally be subject to different sets of parameters in their socio-economic behaviour (Pyatt et al, 1984).

formulation, then the grouping criteria should correspond to constituencies that can be influenced differentially by means of policy. It is argued that household groups based on income levels alone cannot be legislated for as such, on the ground that household units are mobile between these groups, there is a need to identify target households with respect to observable characteristics (Pyatt and Thorbecke, 1976).

In the present SAM, occupational status of the principal earner of the households has been used to classify households. This criterion is likely to capture differences in employment practice, life style and assets among the household types which in turn have different relationships with factors markets, as noticed in the SAM for other countries (e.g., for Malaysia, see Pyatt, Round and Denes 1984). The virtue of this criterion is that two households who have similar income levels, may be significantly different in other aspects, especially according to living standards and patterns of consumption expenditure. According to the above two criteria, six different household groups are distinguished and the households are divided into eight categories.

The main source of information for the above disaggregation of household groups is the 1995/96 Household Expenditure Survey (HES) of the Bangladesh Bureau of Statistics. Usually, the HES provides a breakdown of earners by employment status of head of households and employment status of other than head of households according to 16 income groups. Although information on income and expenditure patterns by 31 occupational groups are collected under the HES, these are not reported in published statistics. The unpublished information collected from the source, have been compiled to generate two matrices to: (i) distribute consumption expenditure by 31 occupational households and 16 income groups in terms of HES commodity classification; (ii) allocate incomes of 31 occupational household groups by 44 major sources of income.

Observing the similarities in the employment characteristics, the 31 household groups are then reclassified into eight occupational groups. The distribution of the households into eight groups is provided in Table 1.

Table 1: Household classification by occupational groups

SAM Classification	HES Classification
01 Professional (PHH)	13. Occupational Officer 14. Executive/Admn. Officer 15. Other Officials Employee 16. Teachers 18. Businessmen 22. Servior, Sports, Newspaper and Others 27. Broker
02 Non-Farm (NFHH)	17. Salesmen 10. Forest and Poultry Worker 11. Servant and Maid Servant 29. Daily Labour 30. Servant and Maid Servant 12. Others
03 Agricultural Labour (AGRL)	05. Agricultural Labour (Landless) 06. Con. Agricultural Labour (Landless) 09. Fishermen
04 Agricultural Family Labour: Small Farm (AGRSF)	03. Agricultural Worker (Own Land) 04. Agricultural Worker (Own and Other Land) 07. Borga Cultivator (Own and Borga Land)
05 Agricultural Labour: Large Farm (AGRLF)	01. Owner Cultivator (Not Self Employed) 02. Owner Cultivator (Self Employed) 08. Tenant (Others)
06 Workers: Skilled (PTWSK)	19. Production Labour (Cottage and Mills) 20. Electricity, Gas and Water Labour 25. Carpenter 21. Construction Worker
07 Workers: Semi-skilled (PTWSS)	23. Blacksmith 24. Potter 26. Spainer 28. Communication Labour
08 Female Headed	31. Female Headed Household

Source: Derived from HES 1995/96

The profiles of the household groups obtained from HES 95/96 are shown in Table 2.

Table 2: Profiles of the household groups

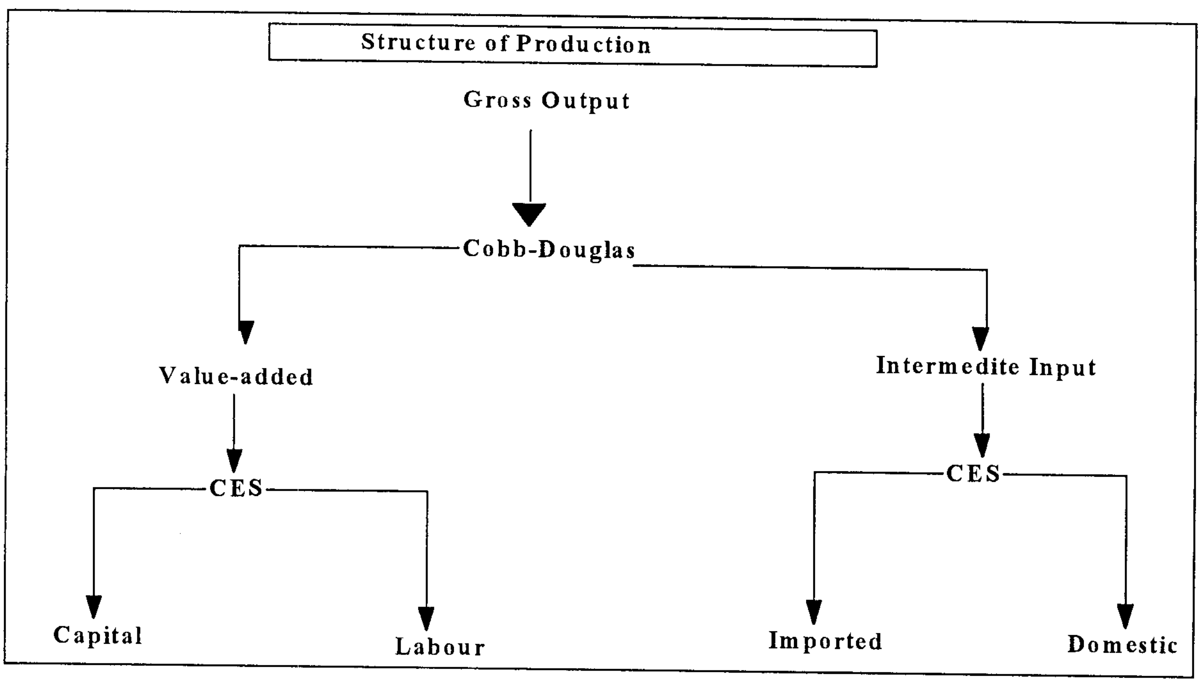
	PHH	Non-Farm	Agr-HL	Large Farm	Small Farm	Sem-skilled	Skilled	Female	All I
HH size	5.23	5.2	4.6	6.97	5.33	5.05	5.56	3.55	
Sample	482	1698	1588	591	1163	930	968	760	
Av. Income (Tk)	8923	3562	2335	6221	3501	5050	6937	3203	
Share	**22.5**	**8.9**	**5.9**	**15.7**	**8.8**	**12.7**	**17.46**	**8.1**	
Av. Consumption (Tk)	8654	3415	2324	5981	3451	4966	6752	3149	
Share	**22.36**	**8.83**	**6.01**	**15.46**	**8.92**	**12.83**	**17.45**	**8.1**	
Food Expenditure (Tk)	3718	1690	1597	2954	2213	2601	3208	1666	
Share	**42.9**	**49.5**	**68.7**	**49.4**	**64.1**	**52.4**	**47.5**	**52.9**	

Source: Derived from HES 95/96.

2.2 General equilibrium formulation for tariff and tax reforms analysis

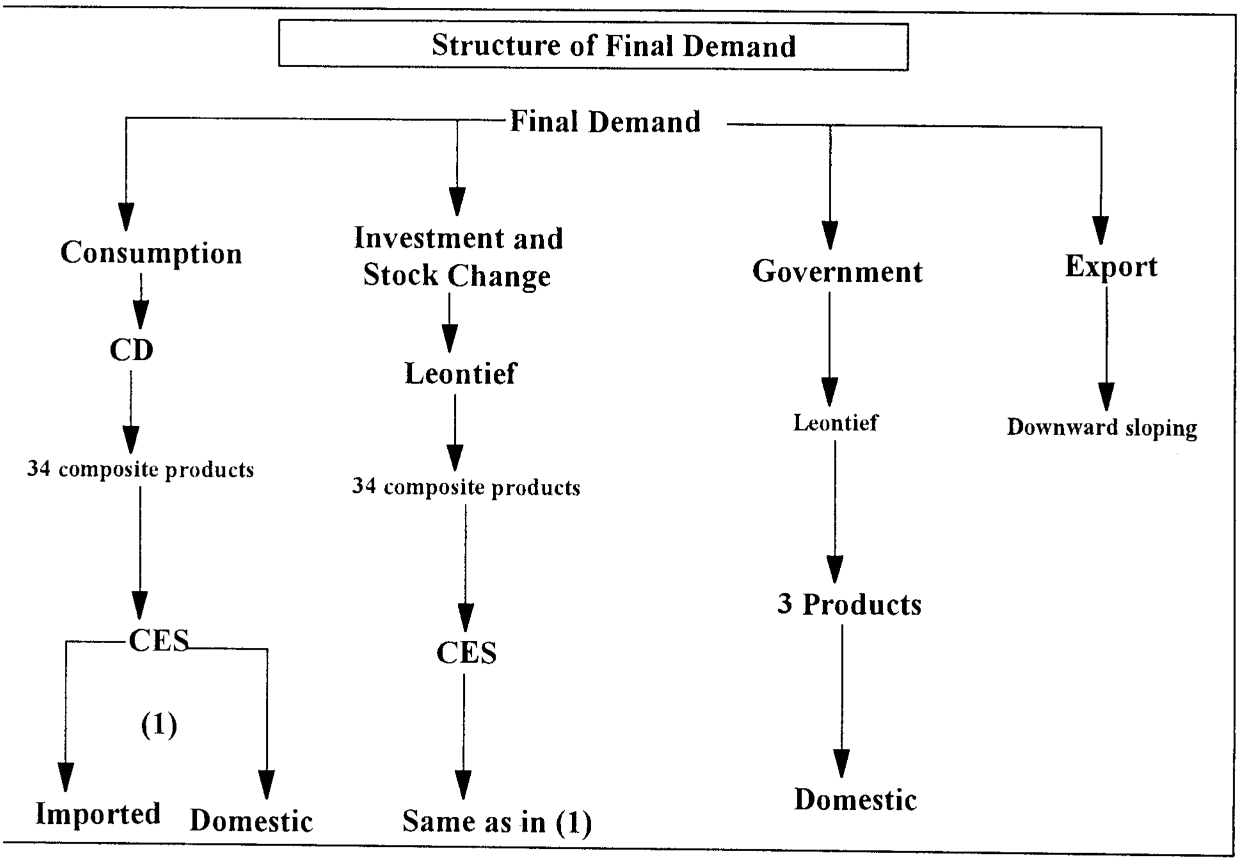
A CGE model has been developed under the project to examine the consequences of adoption of adjustment policies in Bangladesh. The model is treated as the `Core' model which incorporates different features related to specific issues. The specification of the core model is given at Appendix A2. Schematic presentation of the production structure and structure of demand are shown in Figures 1 and 2 respectively. The nested production structure in each sector is presented in Figure 1. At the top level, real value added and intermediate inputs are combined via a Cobb-Douglas (CD) production function to produce output. At the bottom level, there are two CES functions: one for labour and capital to produce real value added and one for imported and domestic intermediates to generate composite intermediate inputs.

Figure 1: Structure of production



Structure of demand is presented in Figure 2. It shows demand for private consumption, demand for public consumption expenditure, investment demand, stock changes and exports demand. Private consumption demand is specified by a CD function which is combined with a nested CES function of composite products. The distribution of investment by sector is modeled using a fixed-coefficient specification. A similar specification is used for the sectoral distribution of change in stocks. The Leontief specification applies to both domestically produced and imported investment and stock building. The formulation of investment is purely static: there is no link between increased savings at present and additional investment in a subsequent time period. In a dynamic model, a policy which has a negative impact on welfare in the current period may yield substantial welfare gains in the long run. These intertemporal features which are important are to be modeled in the future. Total government expenditure is assumed to be exogenous. The distribution of government expenditure by sector is modeled using a fixed-coefficient specification. Export demand is specified by a downward sloping world demand for exports.

Figure 2: Structure of final demand



As an integral part of the adjustment programme, a consumption type value-added tax was introduced in Bangladesh in 1991. Initially the new tax replaced the excise tax system and was confined only to the manufacturing sector. Recently, value-added tax has been extended to services and construction sectors. The Government also introduced a supplementary duty. In order to examine the impacts of changes in the tax system, the core model incorporates the features of the new tax system. The model explicitly captures the specific features of a consumption-type and destination principle-based value-added tax system which has been adopted in Bangladesh. The model also shows the decomposition of sectoral and household consumption expenditures into committed and supernumerary expenditures within a linear expenditure system.

General equilibrium formulation of the value-added tax system

The theory of value added tax (VAT) suggests three broad types of value added taxes which differ in their treatment of capital goods and depreciation of the capital stock in calculating their respective tax bases (Ferh et al, 1994 and Shoup, 1990). These are *consumption, income, and gross product type VAT*. For instance, under the consumption type, each firm computes its tax base by subtracting all its purchases of intermediate and capital goods and depreciation of the capital stock from its total sales. The tax base for an income type VAT is calculated by deducting purchases of intermediate inputs and depreciation of the capital stock from total sales. The gross product type VAT base is computed by subtracting only the purchases of intermediate inputs from total sales. The purchases of capital goods and depreciation are not subtracted. Thus the difference between the three types of value-added tax bases is in their treatment of capital goods and depreciation of the capital stock. Under the consumption type VAT, both purchases of capital goods and depreciation are deductible. In the case of income VAT, only the depreciation of the stock is subtracted. The deduction of purchases of capital goods or depreciation is not allowed under the gross product type VAT.

Sullivan (1965) argues that three concepts of national income accounts are related to the three bases suggested for the value-added tax. These three concepts of national income accounts are personal consumption expenditures; national income proper; and gross national product. The corresponding tax bases are the consumption-type, income-type and gross product-type respectively. To show the linkages between national income accounts and the tax bases, Ferh et al (1994) consider a closed economy at an aggregate or macro level. At an aggregate level, total sales minus total outlays on intermediate inputs yields the gross national product. Purchases of capital goods are equal to gross investment expenditures (net investment and depreciation). When gross investment is deducted from gross national product, one obtains aggregate consumption as the aggregate tax base. Under the income VAT, only the depreciation is subtracted from gross national product. In this case, the aggregate tax base equals aggregate net value added or national product. In the case of gross product type VAT, gross investment is not deductible from gross national product. The aggregate tax base, therefore, equals the gross national product.

With respect to international trade taxation, two distinct principles are in operation (Ferh et al, 1994 and Shoup, 1990). Under the 'destination principle', exports leave a country free of any VAT, while imported commodities are subject to (import) VAT at the rate applied to comparable domestic goods. The 'destination principle' ensures that commodities are taxed in a country where they are consumed (the country of destination), regardless of the country where they are produced. Exports are zero rated under this principle. This means that no VAT is charged on export sales, and that VAT on all inputs used in the production of exports is rebated. In contrast, under the 'origin principle' there is no rebate for VAT on exports, and imports are not taxed in the importing countries. If this principle is applied, commodities are taxed in the country where there are produced, regardless of the country where they are consumed.

There are three methods by which a taxpaying firm can assess its tax liability. These are subtraction, tax credit and addition. However, tax credit method is widely used as it is compatible with consumption VAT system.

Almost all countries that have introduced the value-added tax system, adopt the consumption-type VAT because it is easier to compute and all purchases including purchase of capital goods from other firms are deductible from a firm's sale (Shoup, 1990). However, certain countries such as Argentina, Peru and Turkey have adopted the income type VAT. On the other hand Finland, Morocco and Senegal have employed a gross product type VAT. The gross product VAT, as it does not allow deduction of both purchases of capital goods and depreciation, discriminates against the use of capital goods which perhaps explains its restricted use (Shoup, 1990). The developed and semi-industrialised economies mostly use the VAT system in its comprehensive form. A comprehensive VAT refers to a system that includes producers, wholesaler and retailers.

In Bangladesh, like in many other developing economies, the VAT is restricted to domestic manufacturing activities and imports. The VAT system introduced in Bangladesh is of the consumption type and is based on the destination-principle. Thus, all imports and domestic production, excluding primary agriculture type products and most services, intended for final consumption, are subject to VAT. In accordance to the destination-principle, exports are zero-rated. This means that no VAT is charged on export sales, and that VAT and other indirect tax on all inputs used in the production of export goods is rebated. The VAT is consumption-type since all VAT paid on intermediate inputs and capital machinery is creditable against VAT payable on the sale of domestic output.

To incorporate the VAT system in the model, we start with revenue specification of the VAT system. Under the VAT formulation, the excise duty on domestic manufacturing activities and sales taxes on import are replaced by VAT, and the VAT paid on intermediate and capital goods are credited to the domestic manufacturers as offset against the VAT on domestic output. Thus, only the domestic sales are subject to the VAT and there are no VAT on intermediate and capital inputs. In a generalised framework, assuming that domestic sales (D_i) equal the sale of the i-th manufactured product and that the VAT paid on composite intermediate inputs are rebated against the VAT on domestic sales, revenue under the VAT system (VATREV) equals:

$$VATREV = \sum_i PD_i \cdot D_i \cdot tv_i + \overline{PWM_i} \cdot M_i \cdot ER \cdot tv_i - \sum_j \tau_{ij} \cdot (P_j - PN_j) \cdot IN_j \quad (1)$$

where, tv_i is the uniform value-added tax rate. The first component of the above equation denotes revenue from domestic VAT base; second part shows the VAT from the imports and the third component captures the rebated amount of VAT paid on composite intermediate inputs. The government income equation of the core model incorporating the revenue from the VAT system (i.e. VATREV) is:

$$YG = \sum_h th_h \cdot Y_h + \sum_i tm_i \cdot \overline{PWM_i} \cdot M_i \cdot ER + \sum_i td_i \cdot X_i \cdot PD_i + tc \cdot YC + YKG + VATREV \quad (2)$$

The rebate or credit mechanism is specified through the composite intermediate input price equation . The adjusted composite intermediate input price is defined as:

$$PN_i = \sum_j \tau_{ji} \cdot [P_j - \frac{\{(PD_j \cdot D_j + \overline{PWM_j} \cdot M_j \cdot ER) \cdot tv_j\}}{Q_j}] \quad (3)$$

The second part of the right hand side of $[\{(PD_j \cdot D_j + \overline{PWM_j} \cdot M_j \cdot ER) \cdot tv_j\}/Q_j]$ depicts the amount of VAT paid on composite intermediate inputs which are deducted from the gross price of composite intermediate inputs.

The domestic price of import is also modified by the value added tax payable on c.i.f. imports:

$$PM_i = \overline{PWM_i} \cdot ER \cdot (1 + tm_i + tv_i) \quad (4)$$

The other price that is directly influenced by the VAT system is the domestic sale or activity price. Thus, the domestic sale or activity price is adjusted to include the VAT specification:

$$PX_i = \frac{PD_i \cdot (1 - td_i - tv_i) \cdot D_i + PE_i \cdot E_i}{X_i} \tag{5}$$

subject to the condition that when $tv_i > 0$, $td_i = 0$, and when $tv_i = 0$, $td_i > 0$, so that, the VAT and excise duty can not be applied on the same product simultaneously.

The export supply equation is also modified to include the value added tax;

$$E_i = D_i \cdot [\frac{PE_i \cdot (1 - \gamma_i)}{PD_i \cdot (1 - td_i - tv_i) \cdot \gamma_i}]^{\psi_i} \tag{6}$$

Similarly, in order to incorporate the supplementary duty, all the above 6 equations are modified to represent supplementary duty into the system. It should be noted that in the core model the production system has been specified by a Cobb-Douglas function while, in the VAT version, the production function is specified as a CES combination of value-added and intermediate inputs.

Specification of Imports

The specification of foreign trade and its interaction with the domestic economy constitute an important part of the model. In the classical theory of international trade, a traded good is assumed to be one for which (i) the country is a price-taker (i.e. the small country assumption) and (ii) the domestically produced good is a perfect substitute for the corresponding imported good. This specification leads to the results that the domestic price of a traded good is equal to its world price[2]. Finally, when domestic and imported goods are perfect substitutes, the trade creation effects of trade policies tend to be larger than when products are imperfect substitutes.

On the other hand, a large part of the literature adopts a specification of imperfect substitutability between domestic and imported goods (Dervis et al, 1982, Devarajan et al, 1995). The models invoke the Armington (1969) assumption which treats goods of the same type but different countries of origin as imperfect substitutes. According to this assumption, each country produces a unique set of goods which, to a varying degree, are substitutes for,

2 This assumption implies that cross- hauling is ruled out and net trading status of a country takes place, commensurately reducing the revenue figures. Secondly, imports become a residual and except for the case of complete specialisation, there are no explicit import demand functions; rather there are demand functions for imported goods. Thirdly, since the domestic prices are determined completely by world prices, given the small country assumption, there is a tendency for over-specialisation, a feature pointed out as early as 1953 by Samuelson and later discussed by Travis (1972) and Malvin (1968).

but not identical to, goods produced in other countries. This has two advantages. First, it can accommodate cross-hauling in trade data. Second, it avoids the over-specialisation problem discussed earlier. According to Fretz, Srinivasan, and Whalley (1986) this is achieved by 'bounding the production response to trade policy changes from the demand side, since commodities subscripted by country are treated only as imperfect substitutes'. Since imported and domestic goods are only imperfect substitutes, a certain percentage change in the domestic price of imports due to say a change in trade tax, will lead to a smaller percentage change in the price of the domestically traded goods. Thus, dropping of perfect substitution between imports and domestic goods solves the specialisation problem noted above (de Melo, 1987).

In the present model, the Armington specification is adopted because the perfect substitution assumption seems unrealistic for two reasons. First, in Bangladesh there are quality differences between imports and domestic substitutes for most products. Second, at the high level of aggregation adopted in the model, each sector represents a bundle of different goods. For example, the machinery sector includes goods which are produced in Bangladesh (e.g. machine tools) and others (e.g. heavy machinery) which are not produced domestically. It is, therefore, reasonable to suggest that these two goods are not perfect substitutes; rather they are imperfect substitutes.

Thus for each commodity category an "aggregate" or composite commodity Q_i is defined, which is a CES function of imports M_i and domestic good D_i. Domestic consumers are assumed to have a CES utility function over these two goods:

$$Q_i = AQ_i \cdot [\delta_i \cdot M_i^{-\rho_i} + (1-\delta_i) \cdot D_i^{-\rho_i}]^{-1/\rho_i} \qquad (7)$$

where, AQ_i and δ_i are shift and share parameters respectively and σ_i, elasticity of substitution is given by $\sigma_i = \dfrac{1}{1+\rho_i}$. This formulation implies that consumers choose a mix of M_i and D_i depending on their relative prices. Minimising the cost of obtaining a 'unit of utility', subject to (7) yields the following import demand function;

$$M_i = D_i \cdot [\frac{PD_i \cdot \delta_i}{PM_i \cdot (1-\delta_i)}]^{\sigma_i} \qquad (8)$$

As a result of this specification, PD_i is no longer equal to PM_i and PD_i is endogenously determined in the model.

3 Selected simulation results

The simulation results of selected tariff liberalisation and tax experiments are reported in this section. In particular, the distributional consequences of tariff reforms, revenue and incidence effects of introduction of supplementary duty, and impacts of nutrient availability by household groups are outlined. The resource allocation effects under imperfect competition and scale economies are also reported along with poverty alleviating effects of sectoral interventions.

3.1 Distributional consequences of tariff reforms

Several tariff liberalisation simulations have been conducted to examine their distributional consequences and macro economic impacts. These include:

EXER1: Reduction of nominal tariff rates as implemented during the fiscal year 1996-97. In this experiment, no adjustments are made in domestic indirect or direct tax rates to bridge the deficit generated in government revenue as a consequence of reduction of tariff rates.

EXER2: Reduction of nominal tariff rates along with adjustment of manufacturing value-added tax rate to maintain neutrality of government revenue.

EXER3: Reduction of nominal tariff rates along with introduction of lower value-added tax rate (i.e. than the standard rate applicable to manufacturing value added and imports) for construction, miscellaneous service sector and trade sector to maintain neutrality of government revenue.

Macroeconomic Impacts of Tariff Liberalisation

The macroeconomic impacts of tariff liberlisation are reported in Table 3. It is observed that there are gains from tariff liberalisation as liberlisation allows resources to move from protective and inefficient sectors to less protective and more efficient sectors. It is also observed that macroeconomic impacts are more pronounced in the first experiment compared to the other two experiments where neutrality of government revenue has been ensured with adjustment in the domestic production and consumption taxes.

Table 3: Macroeconomic impacts of tariff liberalisation

(% change over base run)

	EXER1	*EXER2*	*EXER3*
Real GDP	0.77	0.36	0.76
GDP Value-added	0.90	0.57	0.91
Current Account Deficit	-11.00	-10.70	-10.80
Exports	-7.46	-7.42	-7.30
Imports	2.44	2.29	2.41
Budget Deficit	-14.21	-	-
Revenue	-3.37	-	-
Tariff	-7.68	-7.83	-7.72
Consumption-Production Taxes	-2.91	8.85	14.75
Income Tax	1.49	0.63	1.07
Corporate Tax	1.26	0.42	0.83
Savings	-0.94	-0.53	0.73
Investment	-0.94	-0.53	0.73

Welfare and income distribution effects of tariff liberalisation

The concept of efficiency or welfare is the starting point for any policy analysis. Unlike a pure theoretical approach where only an ordinal measure of alternative states are examined, in applied policy analysis some measures of welfare are employed to compare movement from one state to another.

Therefore, in applied policy analysis, generally some monetary representations of individual utility functions are used. This is defined as the amount of money required to attain a level of utility at a reference price vector. This is termed as money metric, and its value is derived from the expenditure function. The expenditure function, which is the inverse of the indirect utility function, is a vital tool for welfare analysis and allows 'measurement of utility'. Since the value of expenditure function depends on the set of prices used, there are different money metrics one can use. The most widely used ones are compensating variation (CV) and equivalent variation (EV). These are generally used because they have easy interpretation in terms of the compensated demand curves. In the EV approach, the idea is to measure in money terms, how much income needs to be given to the consumer at the 'pre-policy change' level of prices (P_0) in order to enable him to enjoy the utility level which arises after the policy change is effected ('post-policy change level of utility'). The CV comes from the opposite direction. It measures the change in 'post-policy change' level of prices (P_1) that brings the consumer to the 'pre-policy change' level of utility.

In a many consumer economy, the use of aggregate EV or CV as a measure of welfare changes, although avoids any explicit Social Welfare Function (SWF), has an implicit SWF because of the adding up approach. Boadway and Bruce (1984) show that there are some well-known problems in interpreting the aggregate EVs or CVs and one needs to be careful in interpreting the result of such measures. Social ordering requires more data and judgement than do household ordering and it may not be possible to measure changes in welfare simply on the basis of household orderings of social status drawn from their market behaviour[4]. When EV is used as a measure of welfare, it is implicitly assumed that aggregate market behaviour is generated by a single household whose preferences coincide with the social ordering[5]. In this exercise the Equivalent Variation is used as a measure of welfare to examine welfare impacts of tariff liberalisation.

Table 4: Equivalent variations under different simulations

Household Groups	***EXER1***	*EXER2*	*EXER3*
Professional	1.952	1.401	1.403
Non-Farm	2.070	1.354	1.774
Agricultural Labour	0.626	0.267	0.552
Small Farm	0.694	0.347	0.611
Large Farm	2.592	1.573	2.244
Skilled Worker	0.556	0.316	0.486
Semi-skilled Worker	0.470	0.301	0.443
Female-Headed	0.569	0.416	0.505

It is observed from Table 4 that in the *first experiment*, Equivalent Variations are positive for all household groups. The observed EV is, however, larger for the high-income household groups (e.g. professional, non-farm, and large farm) compared with low income household groups (agricultural labour, semi-skilled and unskilled workers). Contrary to the first experiment, in the *second experiment* observed EVs are lower for all household groups because of lower GDP growth observed in this case. Again the distribution of income appears to favour the high-income household groups (e.g. professional, services, and large farm) compared with low income household groups (agricultural labour, semi-skilled and female-headed). The distribution of income also appears to favour the high-income

4 Social ordering requires more information than household preference orderings as its information base. It also requires some degree of household welfare comparability and measurability. It also requires a method for aggregating individual welfare. Thus the social ordering requires information on comparability and measurability of household welfare as well as a method for aggregating the household welfare. On the other hand, household orderings are based on their market behaviour i.e household's income and market prices.

5 The aggregate EV 'measures' utilities by the money metric and simply adds the utilities together, assuming the constancy of the marginal utility of income. The aggregate EV is like a classical utilitarian social welfare function applied to individuals with constant marginal utility of income. Thus pure redistributive changes do not affect it (Boadway and Bruce, 1984).

households in the *third experiment*. There is, however, no significant difference in the level of EVs observed between this and the second experiment. This is because changes in GDP growth and price movements are almost similar in these two experiments.

The observed EVs are, however, substantially lower for the worker household groups compared to the rural based agricultural household groups. This is perhaps due to the fact that as a result of tariff reforms, resources move from protected sectors (e.g manufacturing) to non-protected sectors such as agricultural activities.

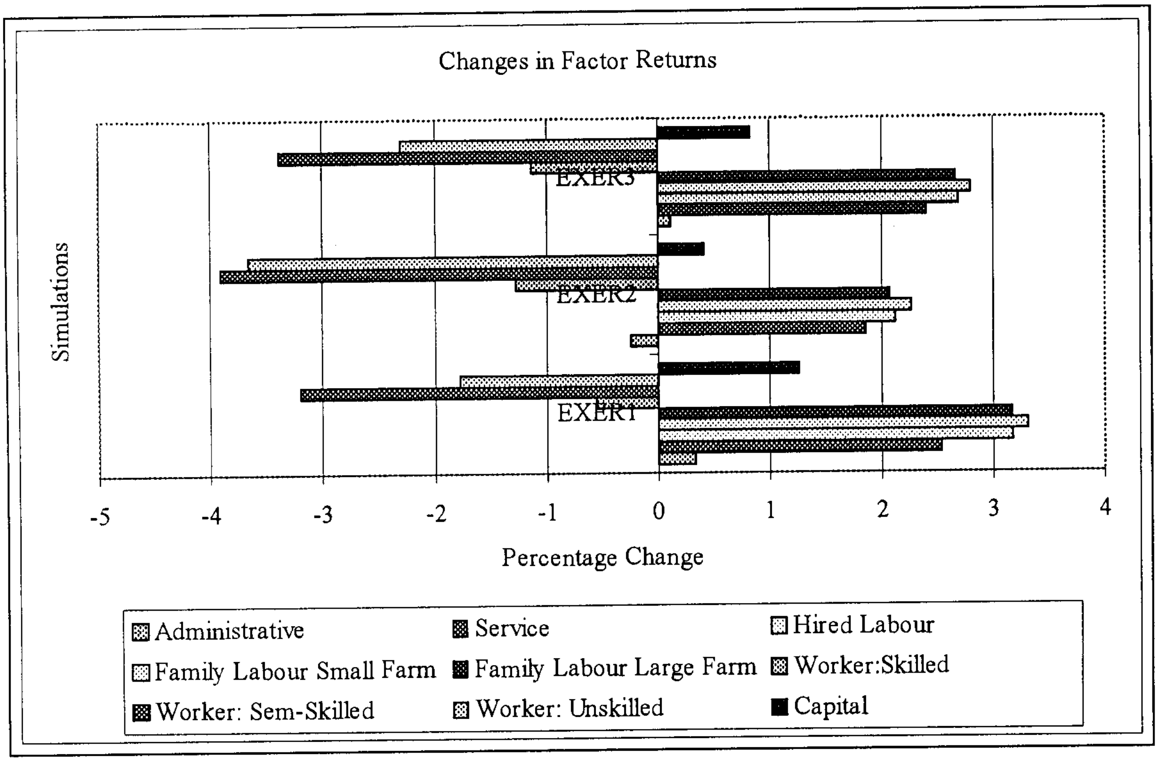
One of the objectives of the 1993/94 SAM and CGE approach is to address the gender aspects of reform programme albeit partially. The consequences of adjustment programmes may be modelled in various ways depending on availability of pertinent data. It may be examined through changes in employment level and wages of female labourers through modeling of labour market incorporating female-labour. Similarly, households may be classified to incorporate female-headed households on the institutional side to examine changes in their income and consumption patterns.

In the present framework, the latter approach is adopted mainly due to availability of data to specify a female-headed household group. Equivalent variations of the female-headed group have been estimated under different scenarios. Based on the estimated EVs, it appears that income distribution effect on female-headed group is moderate. This is due to smaller impact on the income level of the female-headed household group. The female-headed households represent a group composed of heterogeneous households. For example, the group includes urban female entrepreneurs as well as land less female labourers. Thus, the group generates income from almost all-primary factors (e.g both capital and different types of labours). Such diverse sources seem to largely offset gains and/or losses in income from different factors. Hence it appears that the impact on factor income of the female-headed household group is moderate.

Factors returns under different simulations

The impact of tariff liberalisation experiments on wages of different types of labour and rental rate of capital is reported in Figure 3. It is observed that impacts of tariff liberalisation on factor returns are mixed. In all the three experiments it is found that workers engaged in manufacturing activities are the losers as a result of decline in manufacturing GDP. On the other hand, labourers engaged in rural based agricultural activities are the gainers. One can also observe the degree of changes of factor returns under the three different tariff liberalisation experiments. In all the experiments, wage changes are negative for the workers engaged in the manufacturing sectors. It is also observed that decline in wages is more prominent in the revenue neutral tariff experiments where manufacturing and services sectors bear the burden of generating the extra revenue to bridge the deficit in government revenue. On the other hand, increase in wage of labourers engaged in agricultural activity is relatively low in the last two revenue experiments compared to the first experiment.

Figure 3: Changes in factor returns under different tariff liberalisation experiments



4. Proposed future extension of the modeling framework

Flow-of-fund or financial SAM for Bangladesh economy

It has been a common practice in the social accounting matrix (SAM) construction to consolidate the financial transactions between major institutions and production sectors of the economy. There is, therefore, virtually no information on flow-of-funds among institutions; behaviour of the money market, financial market and relationship between financial and non-financial institutions such as households, firms, government and the rest of the world. Aggregation of such information in one consolidated account conceals vital information and reduces the scope for analysing the impact of financial sector reforms involving major financial instruments such as rate of interest, bank rate and credit control.

Since a real SAM with a consolidated capital account conceals vital financial transactions, a financial SAM is needed for adequate analysis of financial sector reforms which are integral components of structural reforms programme in Bangladesh. This can then be integrated into the real part of the SAM. The financial SAM will include a flow-of-funds; and opening and closing balances of assets. Consequently, it will encompass a detailed and consistent description of the disaggregated acquisition and ownership of real and the financial assets. It will also include capital account transactions between major institutional agents: the central bank, the commercial banks, other financial institutions, insurance companies, households, government, non-financial enterprises, and the rest of the world.

Incorporating financial sector in CGE model

One of the main objectives of the computable general equilibrium (CGE) model under the MAP project is to explore the consequences of various adjustment policies adopted by the government on the economy. More specifically, the consequences of the adjustment policies are examined in terms of allocation of resources, household income, distribution of income and extent of poverty. Incorporation of a disaggregated financial sector and its linkages with the supply side of the economy and with major institutions would produce different implications on the above mentioned indicators. This will also help to understand the causality of the impacts on household income distribution, flow-of-funds, and the poverty level of the household groups. The incorporation of financial SAM with important financial instruments e.g. interest rate, bank rate, and credit control will broaden the scope of analysis of the financial sector along with the reforms adopted in the real sector of the economy. The analysis of the implications of the financial sector reforms also appears to be pertinent in view of the present emphasis to liberalise financial markets.

The CGE model would also be expanded to incorporate characteristics of the financial sector. The financial SAM would provide the database for the expanded CGE model. The introduction of financial markets along with different financial assets, e.g., currency, and interest-bearing deposits on loans, would provide alternative stores of wealth to the wealth holders. The primary participants in the financial sector would include firms, households, the central bank, the banking system, and other financial institutions. Incorporation of these financial assets would expand the scope of the model by additional markets, e.g., for currency and credit. The behaviour of the suppliers and demanders in each of these markets will be specified considering the equilibrium conditions of the financial markets (the balance sheets of the actors involved in the sector would provide the conditions of equilibrium). More specifically, the behaviour of the *households* through their preferences for transaction demand and liquidity preference would be incorporated. The role of the central bank would be specified in terms of (i) financing of government debt, (ii) accommodating increase in foreign reserves, and (iii) responding to changes in money supply, required reserved of the banking sector, and foreign and domestic borrowing. The behaviour of the banking sector would be modeled in terms of their operation as financial intermediary between the savers and the borrowers. The other financial sector would provide alternative sources of financing in addition to the banking sector. The behaviour of the firms would be incorporated as demanders for loanable funds for two distinct purposes: (i) to finance the acquisition of new capital stock when the purchase price exceeds the firm's retained profits, and (ii) to finance fraction of the advanced purchase of working capital in the production process. This latter motive reflects the fact that a substantial portion of the credit available from capital market is devoted not to finance capital accumulation but instead to finance the production process. Van Wijnberger (1982) and Taylor (1983) suggest the incorporation of the cost of working capital finance in empirical models applied to less developed countries.

Finally, asset markets equilibrium conditions will be specified. In the credit market, the equilibrium condition is that total assets equal the liabilities of the banking sector and the other financial sector. Equilibrium in the currency market requires the equality between supply of and demand for currency.

Dynamic extension of the CGE model

While the current framework of the CGE model has been useful to evaluate the consequences of tax and tariff policies, the integration of several dynamic features into the model would make it more suitable to analyse the poverty consequences of macro policies. Such dynamic aspects, following Mann (1977) and Fullerton (1983), are likely to include imperfect mobility of capital and other long term dynamic issues, involving generations (Goulder, 1985). The existence of overlapping generations, in different stages of their life cycles and with different resources and constraints, is a key aspect in many long term policy issues and would prove useful to evaluate the efficiency and sustainability of alternative poverty reduction programmes of the government. This would also help to set a target to reach the members of the poor groups in the future considering the first and second round effects. For the planners, this could help to validate the programmes using simulation results.

Within the state-of the-art of dynamic CGE modelling, possible options would be explored to incorporate the relevant aspects. This may involve updating of exogenous variables such as population growth, productivity gains, international prices, and stocks of assets. Some mechanisms for incorporating total factor productivity growth in each sector and the impact of expectations may also be explored.

A Macro econometric model to supplement the CGE framework

Like CGE models, macro econometric models have also been widely used for simulation and forecasting purposes. A macro econometric model specifies the structural aspects of the economy through behavioural equations and establishes the linkages among these equations. It uses time-series information as the data-base. The model tends to be aggregated and the relationships are validated through formal statistical tests. The proposed macro econometric model will be used to generate (annual/half-yearly) forecasts on major macro-aggregates and to simulate impacts of various government policies (especially demand driven policies). The model will supplement the present CGE model in providing the required information to the policy makers. The specification of the model may include, among others, the following equations: demand for money, imports, exports, inflation, real output, capacity output, money supply, balance of payments, domestic credit to the public sector, and expected inflation.

Estimates of elasticity, market structure variables and benefit pattern of public expenditure

It is envisaged that the results of the CGE models are sensitive to elasticity values. In the present version of the model, most of the elasticity values are taken from other studies with appropriate adjustments. At this point, it may be pertinent to undertake studies to generate consistent estimates for such elasticity values. Some of the elasticity values involve **export demand elasticity, substitution elasticity between imports and domestic goods, substitution elasticity between labour factors and others**. It may also be important to undertake studies to estimate market structure variables such as marginal costs, and minimum efficient scale. A study may be undertaken to estimate the benefit patterns of public expenditure programmes in Bangladesh. These information may then be used in the model to examine the incidence of public expenditure programme in the event of changes in sectoral prices, government revenue constraint, and changes in government subsidy policy. The public expenditure incidence may then be added with indirect tax incidence to analyse overall fiscal incidence.

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APPENDIX

Table A_1: Activity Mapping between Reduced and Original SAM

Sectors of Reduced SAM	Sectors of 79 Activity SAM
Cereal Crops	Paddy, Wheat, Other Grains
Commercial Crops	Jute, Sugarcane, Oilseeds, Cotton ,Tobacco Tea
Vegetables	Potato, Vegetables
Pulses	Pulses
Fruits	Fruits
Other Crops	Major Spices, Other Crops
Livestock	Livestock
Poultry	Poultry
Fish	Shrimp, Other Fish, Fish & Sea food
Forestry	Forestry
Rice Milling	Rice Milling
Ata Milling	Ata and Flour Mill
Edible Oil	Edible oil
Sugar and Gur	Sugar & Gur
Other Food	Tea, Salt, Other Food
Leather Products	Tanning & Leather, Leather Product
Yarn	Yarn and Dyeing & Bleaching
Clothing	Mill Cloth and Handloom Cloth, Jute Baling, Jute Textile, Other Textiles
Ready Made Garments	Ready Made Garments and Knitting & Hosiery
Tobacco Products	Cigarettes and Bidi
Pharmaceuticals	Drugs and Pharmaceuticals and Other Chemicals
Fertiliser	Fertiliser
Cement	Cement, Iron and Steel Basic
Machinery	Fabricated Metal Product, Machinery, Transport equipment
Other Industry	Miscellaneous Industry, Saw and Planning Mill, Wooden Furniture, Pulp, Paper & Board, Printing & Publishing, Pottery and Earthware, Glass and Glass Product, China and Ceramic and Bricks, tiles-clay product
Energy	Petroleum Products, Electricity ,Gas and Mining
Construction	Urban Building, Rural Building, Construction: Electric, Construction: Rural road, Construction: other transport, Other Construction
Housing services	Housing services
Health Services	Health Services
Education services	Education services
Public administration	Public administration. & Defense
Finance	Banking & Insurance
Other Services	Professional Services, Hotel & Restaurant, Communications, and Other Services
Trade Services	Trade Services and Transport Services

APPENDIX A$_2$: A General Equilibrium Model of Bangladesh Economy (The Core Model)

The Model Structure

Production and Supply

The production structure is represented by a set of nested functions. Domestic output is a Cobb-Douglas function of value added and composite intermediate inputs. The production technology is described by the following equation:

$$X_i = AX_i \prod_i V_i^{\lambda_i} \cdot IN_i^{(1-\lambda_i)} \qquad (1.1)$$

where, X_i is sectoral output. AX_i and λ_i are the production function shift and share parameters respectively. V_i is sectoral value added and IN_i is aggregation index of intermediate inputs. The composite intermediate input demand function is derived from the first order condition of equation (1.1);

$$IN_i = V_i \cdot [\frac{PV_i \cdot (1-\lambda_i)}{PN_i \cdot \lambda_i}] \qquad (1.2)$$

where, PV_i and PN_i are the value added and composite intermediate input prices respectively.

The value added is a CES aggregate of nine factor inputs which includes capital and eight different categories of labour inputs. The value added function is therefore specified as;

$$V_i = AV_i \cdot [\sum_f \alpha_{if} \cdot FD_{if}^{-\mu_i}]^{\frac{-1}{\mu_i}} \qquad (1.3)$$

where, AV_i and α_{if} are value added function shift and share parameters respectively. μ_i denotes the elasticities of substitution between factors. FD_{if} shows sectoral factors. By profit maximisation with respect to (1.3), the factor demand function is derived as:

$$FD_{if} = V_i \cdot [\frac{\alpha_{if} \cdot PV_i}{AV_i^{\mu_i} \cdot W_f \cdot \varpi_{if}}]^{\frac{1}{1+\mu_i}} \qquad (1.4)$$

where, W_f is the average return of factor f and ϖ_{if} is a sector-specific parameter derived from base year data which captures the fact that in a developing economy factor returns generally differ across sectors.

Prices

Domestic price of imports

On the import side we retain the price-taker small-country assumption of classical trade theory. This implies that the domestic price of import, PM_i is determined exogenously and is linked to the world price in dollars, $\overline{PWM_i}$ by:

$$PM_i = \overline{PWM_i} \cdot ER \cdot (1 + tm_i + st_i) \tag{1.5}$$

where tm_i and st_i are the tariff and sales tax rates on sector i and ER is the nominal exchange rate between US dollars and Bangladesh currency, taka.

Domestic price of exports

On the export side, Bangladesh is assumed to have some market power. In such a situation both the domestic price of exports and the world price of Bangladeshi exports are endogenous. The domestic price of exports is defined as a function of world price of exports PWE_i, and the nominal exchange rate, ER:

$$PE_i = PWE_i \cdot ER \tag{1.6}$$

The world prices of Bangladeshi exports are determined by domestic production costs of exports, and the exchange rate policy.

Composite price

The composite or unit price is defined by the following equation:

$$P_i = \frac{PD_i \cdot D_i + PM_i \cdot M_i}{Q_i} \tag{1.7}$$

where, D_i and M_i are the domestic and imported goods respectively. PD_i is the price of domestic goods.

Sales or Activity prices

The sales or activity price is composed of domestic price of domestic sales and domestic price of exports activities;

$$PX_i = \frac{PD_i \cdot (1 - td_i) \cdot D_i + PE_i \cdot E_i}{X_i} \tag{1.8}$$

where, td_i is the production or excise tax on sector i.

Composite intermediate input price

The composite intermediate input price is specified by the following equation:

$$PN_i = \sum_j \tau_{ji} \cdot P_j \tag{1.9}$$

where, τ_{ij} are the input-output coefficients.

Value-added price

The value-added price is defined as:

$$PV_i = \frac{PX_i \cdot X_i - PN_i \cdot IN_i}{V_i} \tag{1.10}$$

Composite capital good price

The composite capital good price is defined as:

$$PK_i = \sum_j \kappa_{ji} \cdot P_j \tag{1.11}$$

where, κ_{ij} is a capital composition matrix.

General Price Index

Equation 1.12 defines an aggregate price index (PINDEX), which is defined as the GDP deflator.

$$PINDEX = \frac{GDPVA}{RGDP} \tag{1.12}$$

Imports and Exports

Imports

In this model the Armington specification is adopted because the perfect substitution assumption seems unrealistic for two reasons. First, in Bangladesh there are quality differences between imports and domestic substitutes for most products. Second, at a high level of aggregation in the model, each sector represents a bundle of different goods. For example the machinery sector includes goods which are produced in Bangladesh (i.e. machine tools) and others (i.e. heavy machinery) which are not domestically produced. It is therefore reasonable to suggest that these two goods are not perfect substitutes; rather they are imperfect substitutes.

Thus for each commodity category an "aggregate" or composite commodity Q_i is defined, which is a CES function of imports M_i and domestic good D_i. Domestic consumers are assumed to have a CES utility function over these two goods:

$$Q_i = AQ_i \cdot [\delta_i \cdot M_i^{-\rho_i} + (1-\delta_i) \cdot D_i^{-\rho_i}]^{-1/\rho_i} \tag{1.13}$$

where, AQ_i and δ_i are shift and share parameters respectively and σ_i, elasticity of substitution is given by $\sigma_i = \frac{1}{1+\rho_i}$. This formulation implies that consumers will choose a mix of M_i and D_i

depending on their relative prices. Minimising the cost of obtaining a 'unit of utility', subject to (1.12) yields the following import demand function;

$$M_i = D_i \cdot [\frac{PD_i \cdot \delta_i}{PM_i \cdot (1-\delta_i)}]^{\sigma_i} \qquad (1.14)$$

As a result of this specification, PD_i is no longer equal to PM_i and PD_i is endogenously determined in the model.

Exports

As mentioned earlier, on the export side Bangladesh is assumed have some market power for exports. This assumption is particularly relevant for traditional exports, such as jute and jute products, where Bangladeshi exports are significant and where Bangladesh has some market power. For other sectors, Bangladesh may not have such market power. However, given such a high level sectoral aggregation it is difficult to identify sectors with and without market power. Thus, a downward sloping world demand curve for all exports is assumed. The export demand function can be shown as:

$$E_i = E_i^0 \cdot [\frac{PWE_i}{\overline{PWSE_i}}]^{\eta_i} \qquad (1.15)$$

where, E_i^0 is a constant, η_i is the price elasticity of export demand and $\overline{PWSE_i}$ is world price of goods which are close substitutes of Bangladeshi exports.

We postulate a constant elasticity of transformation (CET) function between domestically consumed goods D_i and exported goods E_i for total supply:

$$X_i = AT_i \cdot [\gamma_i \cdot E_i^{\phi_i} + (1-\gamma_i) \cdot D_i^{\phi_i}]^{1/\phi_i} \qquad (1.16)$$

where X_i is domestic output, AT_i and γ_i are constant and the elasticity of transformation is given by $\psi_i = \frac{1}{1-\phi_i}$. Maximising revenue from given a output, subject to equation (1.15) yields the export supply function as:

$$E_i = D_i \cdot [\frac{PE_i \cdot (1-\gamma_i)}{PD_i \cdot (1-td_i) \cdot \gamma_i}]^{\psi_i} \qquad (1.17)$$

The treatment of imports and exports allows two-way trade (that is simultaneous exports and imports, known as cross-hauling) at the sectoral level, again reflecting empirical realities in developing countries. Similar reasons were put forward by Condon et al (1986) to model the foreign trade regime of Cameroon based on CES and CET specifications.

Incomes

Household Income

The household income from factors is specified as;

$$YF_h = \sum_f \Phi_{hf} \cdot Y_f \tag{1.18}$$

where, YF_h, Φ_{hf} and Y_f define household income from factors, the factors to households allocation matrix, and income by factors, respectively. The following equation is used to calculate factor income:

$$Y_f = \prod_i W_f \cdot \varpi_{if} \cdot FD_{if} \tag{1.19}$$

Besides factor incomes, the households also receive remittances from abroad, dividend income from corporations, direct transfers from government and net transfer of resources from other households. The shares from all these sources are fixed in the benchmark level and thus relative shares do not change across experiments. Spendable income equation of household is specified as;

$$Y_h = [YF_h + \overline{RM_h} \cdot ER + \overline{GTR_h}] \cdot (1 - th_h - s_h) \tag{1.20}$$

where, $\overline{RM_h}$ and $\overline{GTR_h}$ are the shares of household income from remittances, and government transfers respectively. Income tax rates and savings rates for different household groups are denoted by th_h and s_h respectively.

Government Income

Government derives income from all indirect and direct taxes and part of capital income to reflect the income generated from public sector corporations. The income equation has the form:

$$\begin{aligned} YG = & \sum_h th_h \cdot Y_h + \sum_i tm_i \cdot \overline{PWM_i} \cdot M_i \cdot ER \\ & + \sum_i td_i \cdot X_i \cdot PD_i + tc \cdot YC + YFG \end{aligned} \tag{1.21}$$

where, t_c denotes the corporate tax rate. YFG shows government income from capital. This is endogenously derived as $YFG = \zeta_f \cdot Y_f$. Where, ζ_f is a scalar showing government share of income from the capital factor only.

Corporation Income

Corporations generate all their income from capital only. There are no other sources of income for the corporate institutions in the model. Corporation income is represented by the following equation:

$$YC = \chi_f \cdot Y_f \tag{1.22}$$

where, χ_f is a scalar showing corporation share of income from the capital factor only.

Product Demand

Consumption Demand

Total consumption demand is composed of private and government consumption. Consumption behaviour of each household is specified in the form of a representative household (for each household group), maximising acobb-Douglas utility function subject to the budget constraint of the household:

$$U_h = \prod_i CD_{ih}^{\beta_{ih}} \tag{1.23}$$

Maximisation of utility function subject to the household income yields a linear expenditure system of the form:

$$CD_{ih} = \frac{\beta_{ih} \cdot Y_h}{P_i} \tag{1.24}$$

where, CD_{ih} is consumption of good i by household group h, and β_{ih} depicts the marginal budget share of good i by household h and Y_h denotes income of each household .

Government Demand

The government is assumed to keep the real level of expenditure on each commodity fixed. Hence, government demand for commodity i is:

$$\overline{GD_i} = \beta_i^g \cdot \overline{GTOT} \tag{1.25}$$

where, $\overline{GTOT}$ is total fixed government expenditure. In the application model β_i^g is zero for all but three sectors such as education, health and public administration, for which $\sum_1^3 \beta_i^g = 1$.

Intermediate Demand

Since the shares among different intermediate inputs in a sector and the ratios of intermediate inputs to total outputs are fixed, one can write the demand for intermediate inputs as:

$$INT_i = \sum_j \tau_{ij} \cdot IN_j \tag{1.26}$$

where, τ_{ij} are input-output coefficients and IN_j are sectoral intermediate inputs.

Investment Demand

Total investment is always equal to savings in equilibrium. Total investment is composed of fixed capital formation and inventory investments or stock change. Investory Investment in each sector is a fixed proportion of output.

$$DST_i = \lambda_i \cdot X_i \tag{1.27}$$

Fixed capital formation is given by:

$$FI = I - \sum_i PQ_i \cdot DST_i \tag{1.28}$$

$$PK_i \cdot DK_i = \xi_i \cdot FI \tag{1.29}$$

where, DK_i is capital investment by sector i, PK_i is the composite price of capital installed sector i and ξ_i is the proportion of total capital investment accounted for by sector i. Investment by sector of destinations is then translated into demand for capital goods by sector of origin (ID_i), using a capital composition matrix κ_{ij}:

$$ID_i = \sum_j \kappa_{ij} \cdot DK_j \tag{1.30}$$

Savings

Total savings is the sum of household, government, corporate and foreign savings. Households save a fixed proportion of their income. Following equation specify the savings behaviour of the households:

$$SH_h = s_h \cdot Y_h \tag{1.31}$$

The government savings is the difference between the endogenous government income and exogenous government expenditure and transfers to the household groups. The government savings is thus:

$$SG = YG - \sum_i \overline{GD_i} - \sum_h \overline{GTR_h} \tag{1.32}$$

Corporate savings is the difference between endogenous corporate income and corporate tax and dividend payment to household groups. The corporate savings is thus:

$$SC = YC - tc \cdot YC \tag{1.33}$$

The last component of aggregate savings is the foreign savings. Foreign savings is the difference between the value of imports and the value of exports, at world prices. The dollar value of foreign savings is then converted into domestic currency value using the relevant exchange rate. The aggregate or total savings is thus:

$$S = \sum_h SH_h + SG + SC + SF \cdot ER \tag{1.34}$$

Nominal and Real GDP

Equations (1.35) and (1.36) define nominal and real GDP, which are used to calculate the GDP deflator specified as numeraire in the price equation. Real GDP is defined from the expenditure side, with imports valued at in world prices. In other word, the value of imports included in GDP excludes tariffs in the base year. Nominal GDP is generated from the value added side.

$$GDPVA = \sum_i PV_i \cdot V_i + INDTAX + TARIFF \qquad (1.35)$$

$$RGDP = \sum_i \left(CD_i + GD_i + ID_i + DST_i + E_i - PWM_i \cdot M_i \cdot ER\right) \qquad (1.36)$$

Equilibrium Conditions

Factor Market Equilibrium

The labour market is particularly simple and full employment of factors (i.e. labour and capital) is assumed. Thus, the factor market clearing requires that total factor demands equal exogenously fixed factor supplies and the equilibrating variables are the average factor prices (W_f).

$$\sum_i FD_{if} - FS_f = 0 \qquad (1.37)$$

Product Market Equilibrium

$$Q_i = INT_i + \sum_h CD_{hi} + GD_i + ID_i + DST_i \qquad (1.38)$$

Equation (1.38) is the material balance equation for each sector, requiring that total composite supply (Q) is equal to the sum of composite demands.

Balance of Payments

We impose the balance of payment (BOP) equation to clear the foreign exchange market. The inflows are exogenous but imports and exports are determined endogenously in the model. Since nominal exchange rate and foreign savings are fixed in this model price index is allowed to vary to clear the foreign exchange market.

$$[\sum_i \overline{PWM_i} \cdot M_i] - [\sum_i PWE_i \cdot E_i + \sum_h \overline{RM_h} + SF] = 0 \qquad (1.39)$$

Savings-Investment Balance

The final macro closure is achieved through the equality of endogenously determined aggregate savings and exogenously fixed total investment. Thus, this closure is "Savings driven", in which total investment is fixed and the saving components are endogenous:

$$I = S = \sum_h SH_h + SG + SC + SF \cdot ER \tag{1.40}$$

In the model only relative prices are determined. Thus it is necessary to normalise the price system. We make the GDP deflator or price index numeraire against which all relative prices will be determined. One can virtually normalise around any nominal magnitude because it has no effect on real variables. On the other hand, normalisation basically closes the system and allows one to solve the model for prices as a function of exogenous parameters and policy variables.

C. Adjustment and Household Welfare: A Multisectoral Analysis

Adjustment and Household Welfare: A Multisectoral Analysis

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I. Introduction

Many developing countries including India, in the face of the internal as wall as external imbalances, have undergone some forms or other structural changes over the years. Various kinds of stabilization and structural adjustment policies (SSA) are attempted in these countries. Most of the policies are initially directed at the macro imbalances in the country. The IMF and even the government policy makers look at the macro implications of the policies. Generally, the macro variables like inflation, budget deficit, trade deficit, exchange rate are monitored. The impact on households is not monitored. However, their impacts at the household level are of great concern to any society.

India has an impressive record of growth since late 1980s. But it faces massive challenges of poverty, inequality and low quality of life. Quite substantial amount of research has gone into the problems of economic reforms. But hardly, any attempt has been made to link the macro level policies to micro level impacts. A computable general equilibrium (CGE) model becomes suitable for such type of analysis. This type of multi-sector, multi-agent linkage model becomes an indispensable tool for development economists and policy makers.

In this paper, we have produced two variants of the model. In the first model labour supply is assumed to be fixed (Section2). Attempt has been made in the second model to integrate the labour efficiency into the system emphasising the role of education and health (Section 3). The policy simulations are elaborated in the subsections of each of the model, where we analyse the impact of taxes, tariffs and expenditure policies on different socio-economic groups of households. The last section contains the conclusion. The equations for the model are provided in Appendix-IV.

2. The Model: With Fixed Labour Supply

The model, which is based on the 1983 table updated to 1989-90 I-O table, contains ten production activities and two factors of production, viz. labour and capital. Household and Government are the two institutions. The household institution is classified into six rural categories and one urban category (for detailed sectorisation, Appendix-I). As the model has been static one, the investment acts as one of the final demands only. Exported and imported goods are differentiated from the domestically produced goods by a 'Constant Elasticity of Transformation' (CET) and 'Constant Elasticity of Substitution' (CES) function respectively. Neo-classical macro closure is assumed in case of trade as well as investment-saving balance. Various policy simulations in regards to taxes and government expenditures have been attempted.

The main aim of our model has been to capture the impacts of various macro-economic policy changes at the macro level on the welfare of the households. The model follows closely the applications of SAM-based CGE models to the developing countries by, Dervis et al. (1982), Condon et al. (1987) and Devarajan et al. (1991). It is neo-classical and Walrasian in spirit. Some of the key features of our model can be outlined below.

A. The model is static one where investment is not made to add to the capital formation. It only plays as one of the macro demand variables.

B. Physical capital and labour are fully utilised and mobile across sectors.

C. In the government's budget constraint, transfer to households is residual and government expenditure is fixed. The government saving is determined in the investment-saving closure.

D. In the external closure, the exchange rate moves freely in the system, while the foreign saving is fixed exogenously.

E. The model does not distinguish between purely exportable and importable sectors.

F. Foreign and domestically produced goods are assumed to be imperfect substitutes in use.

G. Total investment is given in the economy. Total saving is investment driven, which allows the government saving to be residually determined.

H. Demands equal supplies in all commodities and zero profits are made in all industries.

2.1 Production Activities and the Factor Market

Each producing sector produces a single and distinct commodity. The output in a sector is a Leontief function of intermediate inputs and real value added in that sector. The value added is a CES function of the primary factors, i.e. labour input and capital stock. This nesting is taken care of in the following manner. Output is a function of labour and capital. But the cost of production also includes the cost of fixed intermediate use.

It is assumed that factors are mobile across sectors and the aggregate labour supply and capital stock fixed in the system. They are the simple aggregation of the factors owned by the households. These total factor supplies are allotted to different sectors according to the demands generated from them.

Each sector is assumed to be one firm, maximising profit using factors and intermediate products. The producers get revenue by selling their products. They make payments to the government as excise taxes, to factors as wages on labour and rentals on capital and other producers for the purchase of raw materials. Their receipt is equal to their payment. This is called the zero profit condition. Prices attached to the demand for intermediate inputs are the producer prices, not the composite prices, because as per the assumption our intermediate inputs are not imported.

The above described producer behaviour results in well- behaved supply functions for commodities, demand functions for intermediate consumption and revenue (on account of excise tax) for the government. Given the wage rate and rental, the factor incomes are also determined.

2.2 Private Income and Consumption Demand

There are seven private consumers in the system. The consumers derive their income by selling the factors they own. Their budget also includes the taxes they pay to and transfers they receive from the government. Their income includes transfer from abroad as well. The households are assumed to save a fixed fraction of their disposable income. The rest of it is spent on the consumption of goods. The consumption functions of the households are estimated by the most suitable linear expenditure system (LES) which is widely used in India.

2.3 Exports and Imports

Imports and exports augment the total supply and demand respectively. Similarly, imports deplete the demand, while exports the supply in the domestic market. There are six tradable sectors in the model.

The model follows the standard small country assumption, i.e. India can import as much as it wants, given the world price level. It is a price taker and cannot affect the world prices. For import, world prices are given and on the export side, a downward sloping world demand curve is assumed. Imports and exports are functions of world prices relative to the domestic prices and exchange rate. The importable goods are not the same as the domestic goods. The Armington assumption is used for this purpose. Exported goods are assumed to be different from goods for domestic consumption. To capture this, the domestic supply of output is a constant elasticity transformation (CET) function of above two.

2.4 The Government Sector

We have very simplistic assumption for the government behaviour. The government does not take part in production. The government gets its revenue from the excise tax on production, sales tax on goods, import duties from imported goods and income tax from households. Government income also includes the income from the entrepreneurship, and current as well as factor income from abroad. Government always balances its budget. Government budget includes residual transfer payments to households, while its current consumption expenditure is fixed exogenously. The jovernment saving is endogenously determined in the saving-investment closure.

!.5 Model Closure and Equilibrium Conditions

The model presented is purely static one. The endogenous variables are simultaneously determined in the system. The Walras Law holds as all the economic agents, the households, the producers and the government balance their budgets. The gross domestic product is same whether calculated from income or product side.

The supplies of both domestic and imports are functions of product and factor prices. The demands, both domestic and exports are also functions of product and factor prices. The excess demand functions are equalised to zero. They are homogeneous of degree zero in prices. Factor Price of labour is chosen as numeraire and is normalised to unity.

The macroeconomic equilibrium conditions for the balance of payments and the saving-investment balance close the model. Total savings comprise of private savings, government savings and foreign savings. Total investment is given in the economy and the government saving is adjusted to balance the saving-investment closure.

The balance of payment constraint holds. The foreign savings in dollar term are the difference between the total imports and total imports valued at the world price with net transfer and factor payment from abroad. For the specification of macro closure, exchange rate is endogenously determined while the foreign saving in dollar term is fixed.

2.6 Calibration and The Benchmark Equilibrium Data Set

The Social Accounting Matrix (SAM) gives the benchmark equilibrium data set for the model. The SAM used here is constructed by Pradhan and Sahoo (1996) using 1989-90 Input-Output table The SAM is reproduced in Appendix-II.

Calibration involves a deterministic approach to specifying parameter values to be used in an applied general equilibrium model (Shoven and Whalley, 1992). In calibration if we solve the model using the base year data inputs, the result will be the input data itself. This requires finding values of 'shift' and 'sharing' parameters for production functions, the CES aggregation function for imports and the CET function of exports. Given benchmark data for all the variables and with estimated elasticity parameters, the shift and share parameters are calibrated.

In the LES demand functions, the values of marginal budget shares and minimum consumption parameters have been estimated with the help of micro household data taken from MIMAP Household Income Survey (1995), conducted by the National Council of Applied Economic Research (NCAER), New Delhi. In the benchmark, the minimum consumption parameters are calibrated with the use of these budget shares and the 'supernumerary income ratio'[1] for each household.

In the benchmark equilibrium, units are so chosen that all the prices including factor prices set to one except for the composite price. Given this, the associated quantities are known from the given SAM. The model has been solved with the Generalised Algebraic Modelling System (GAMS) software.

2.7 Policy Issues

For a model to be successful, it is essential to do some relevant simulation exercises that should address to the policy issues of the economy. In the wake of India's New Economic Policy, attempts have been made by the policy makers to change the structure of the existing tax and trade policies, viz. reducing the excise duties and also sales taxes by the state government in some cases, moving away from quantity control to tariff control and gradually reducing the tariff rates, better income tax structure, etc. However, despite the various policy changes in the liberlised regime, the total investment required for the economy is assumed to be determined by the policy maker. This, to some extent, emphasises the role of planning (policy making) in the Indian economy. Policy makers have always been concerned about the efficiency of a

[1] The supernumerary income ratio measures the amount of available spending power that consumers have above the minimum consumption level. For details see Taylor, 1990.

›articular type of tax. Different tax policies could have different impact on the welfare ınd revenue of the economy. In Indian tax system, there is no tax on factors of ›roduction. In the policy simulation attempt has been to introduce the factor tax on abour and capital vis-à-vis the domestic taxes.

Γhe policy changes have no doubt impacted on the households by affecting their ncome and consumption levels, and hence, their welfare. Hence, in order to look into he above issues, following simulation exercises are proposed in the model. The ollowing relevant simulation exercises have been attempted for the analysis.

SIM1: 10 % reduction in import Tariff on the manufacturing industry other than capital goods and simultaneously varying the Excise duty on this industry.

SIM2: 10% reduction in excise tax on the manufacturing industry other than capital goods and simultaneously varying the sales tax on this industry.

SIM3: 10% reduction in import Tariff on the manufacturing industry other than capital goods and simultaneously varying the sale tax on this industry.

SIM4: 10% reduction in excise duty on the manufacturing industry other than capital goods and simultaneously varying the income tax rate.

SIM5: 30% reduction in excise duty on the manufacturing industry other than capital goods and simultaneously varying the factor tax on capital in this industry.

SIM6: 30% reduction in excise duty on the manufacturing industry other than capital goods and simultaneously varying the factor tax on labour in this industry.

In the model, for the simulation purpose, tax revenues are fixed equal to the new real benchmark value i.e. using the Laspeyres Price index method. Tax rates will now be variables. This would determine an equilibrium equal yield tax rate.

A reduction in tariff and varying excise tax keeping the base period revenue constant (SIM 1) has shown over all inequality in the economy has not been affected much, rather it has improved to some extent (from base period 1959 to 0.1958). The relative factors price of capital as against the labour declines. This has marked a shift in relative factor demand from labour to less expensive capital. There has been an increase in welfare for whole economy as well as for each household group. Rural agricultural households, of which agricultural self-employed household group gets maximum welfare benefit and on the other hand, the minimum welfare gain is accrued to the other household group. The rise in welfare gain is because of the increase in real consumption of agricultural commodities, electricity, education and manufacturing industries other than capital goods. Production of all these commodities have gone up except for the manufacturing industries. However, the domestic availability of the manufacturing commodities could have gone up because of the rise in its import. A rise in excise duty on the manufacturing commodities leads to relative price rise in producer price of this industry. The domestic prices (PD) and the composite prices (PC) play important role in determining the structure of the domestic demand for domestically produced goods and for tradable goods. The structure of domestic prices depends on the relative importance of demand and supply of domestically produced goods vis-à-vis the tradables. It is seen that import price of manufacturing commodities has significantly gone down, while these have gone up for capital goods and, mining and quarrying. This has led to increase in imports of the former and decline in the case of capital goods and mining and quarrying. On the other hand the relative increases in the domestic price vis-à-vis the export price reduces the production of less profitable exportable sectors. However, it depends on the price competition faced by domestic traded goods depending on how substitutable they are, in both domestic and exportable markets. This has caused the decline in the export of manufacturing commodities significantly. Despite the lower composite price for this industry which is likely to increase the domestic demand, due to the a significant dampening impact of export demand the production of manufacturing commodities goes down.

The Excise duty and the sale tax are the two domestic taxes, one is levied on the production of and the other on the demand for the commodity. The simulation pertaining to reducing the excise duty while varying the sale tax (SIM 2) on the manufacturing commodities other than the capital goods has led to a slight increase in the inequality (from base 0.1959 to 0.1962). The over all welfare of the economy goes up, but it declines for the rural non-agricultural households. Urban households gain the nost in the rise in welfare and among the rural households, the welfare rises more for salaried class. The rural non-agricultural labour incurs the most welfare loss. It is nostly the increase in the real consumption demand for the manufacturing commodities, which has helped in rise in welfare of some households. The production of manufacturing industry has gone up, while that of agriculture and electricity declined. The decline in excise on production of manufacturing industry is seen to be having more say on the domestic price than the increase in the sales tax. The producer price, the domestic price and the composite price of this sector relative to other sectors has declined.

A reduction in tariff and varying the domestic sale tax (SIM 3) on the manufacturing commodities has slightly deteriorated the inequality in the economy (from 0.1959 to 0.1962), while the over all welfare of the economy has gone up. All the household groups except the rural non-agricultural labour have shown increase in welfare. There has been a significant welfare gain for urban households, while a loss for the rural non-agricultural labour. Like the SIM 1, in this case also the production of manufacturing industry has declined while its demand for consumption across all the household groups has gone up. This is mainly because of the increase in the domestic availability due to rise in imports. The increase in the final domestic demand due to the decrease in the relative composite price of the manufacturing commodities is outweighed by the sharp decline in the export demand for this. This has a dampening impact on the production. The decline in the relative factor price of capital has caused a shift in the factor demand from labour to capital.

A decrease in the excise duty on the manufacturing commodities while adjusting the income tax (SIM 4) has slightly worsened the income distribution (Ginni coefficient from 0.1959 to 0.1960). The income tax is levied only on the urban households. The over all welfare of the society has declined. It has declined significantly for the urban households and among rural households groups, for the non-agricultural wage earners. The maximum welfare gain accrues to the rural agricultural self-employed and the rural salaried class. The household demand has been mostly for the manufacturing commodities and the least for the electricity. For the former, the production has gone up, whereas for the latter, it has declined significantly. Due to the decline in the excise, all the relative prices of the manufacturing industry have gone down. This causes a rise in the domestic demand for the manufacturing commodities, while a decline in the import of these commodities. There has been a shift in the factor demand for the labour because of the increase in the relative price of the capital.

In SIM 5 and 6, the tax on the factors of production has been introduced. A cutting down of the excise duty on the manufacturing commodities and varying the factor tax on the capital in the manufacturing industry (SIM 6) has resulted in slightly deterioration of income distribution (Ginni coefficient from 0.1959 to 0.1961). There has been a welfare gain in the economy, despite the welfare loss of three houehold groups, viz. rural agricultural self-employed, rural non-agricultural self-employed and rural other households. The urban households derive the maximum welfare while the rural agricultural self-employed incurs a significant decline in the welfare. Among the rural household groups, the agricultural labour household group benefits from this policy. There has been a significant decline in the factor price for the capital relative to the labour, which leads to the decline in the relative demand for the labour for all industries except for the manufacturing industry. It is interesting to note that the electricity sector has gained in this policy change. Its production has gone up significantly and also its demand from the household groups has also shown significant rise. Though the production of manufacturing industry has shown an increase, other sectors like capital goods and mining and quarrying have also increased their output more than the manufacturing industry. However, the agricultural production has declined. Except for the capital goods, there is a decline in the import demand. There has been a significant slump in the export demand for the manufacturing industry.

If the excise duty on the manufacturing industry is reduced varying the factor tax on the labour in this industry, the income distribution slightly improves (Ginni coefficient rom 0.1959 to 0.1958). On the other hand, the welfare of the economy declines)ecause of the reduction in the welfare for the urban households, rural agricultural abour, rural non-agricultural labour and rural salaried class. The urban households ave maximum decline in the welfare. Among rural household groups, agricultural abour incurred maximum loss of welfare. Rural agricultural self-employed has gained naximum welfare in this scenario. The factor price of capital has shown a significant ncrease relative to the labour resulting in the decline in the relative demand for capital or almost all industries but for the manufacturing industry. Barring the production of agriculture, education and health, other sectors shown slide in the production. Among he relative prices of other industries, the agricultural prices have marked relatively slow rise. This has caused the rise in the relative demand for the agriculture and ence, resulting in the rise in the production. Unlike the SIM 6, in this case the imports of all the commodities rise except for the capital goods and the relative demand for the export of manufacturing industry is the highest.

5. Conclusion

In the Indian economy, fiscal policies, the tax policies thereof, play vary significant role in guiding the price, demand and production of the economy. They affect the welfare of the economy directly as well as indirectly. These issues have been analysed using two CGE models, which have taken care of all the relevant tax structure of the Indian economy. It is seen that the import tax on the manufacturing industry vis-à-vis the domestic taxes has given rise to more household welfare. In the domestic tax policies, the excise tax results in a gain in the welfare vis-à-vis the sale tax. A raise in the income tax vis-à-vis a reduction in the domestic tax on the industry yields the total welfare loss, mainly because of the urban households who pay the income tax. However, there has been a gain in welfare for all the rural household groups. A increase in the factor tax on labour in the manufacturing industry while reducing the excise on the same industry is preferable to a increase in the factor tax on capital from the household welfare point of view.

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APPENDIX-I

Factors of Production

1. Labour

2. Capital

Production Sectors

1. Foodgrains

2. Other Agriculture

3. Mining & Quarry

4. Manufacturing Industries other than Capital goods

5. Capital Goods

6. Construction

7. Electricity, Gas & Water

8. Education

9. Health

10. Other Services

Households

a.Rural Households

1. Agricultural Self-Employed

2. Agricultural Labour

3. Non-agricultural Labour

4. Non-Agricultural Self-Employed

5. Salaried Class

6. Other Households

b. Urban Households

APPENDIX – II

Social Accounting Matrix for India, 1989-90 (Rs. Million)

	FACTORS		RURAL								
	Labour	Capital	Ag.Self Employ.	Agril Labour	Non Ag. Labour	Non Ag. Self	Salaried class	Other house.	Urban house.	GOVT.	IND.TAX
Labour											
Capital											
HOUSEHOLDS											
AG. SELF(R)	1301820	87350								8440	
AG LAB(R)	285320	370								1510	
NON AG.LAB(R)	11930	30								80	
NON AG. SELF(R)	233710	24840								1480	
SALARIED(R)	238770	10680								1540	
OTHERS(R)	28140	45830								67680	
URBAN	683945	1027605								216420	
GOVERNMENT	0	106270							118880	1660	481590
IND. TAXES			37717	15732	985	10580	4951	8874	41714	18990	
ACTIVITIES											
FOODGR			189275	101475	8834	50684	18310	32865	114007	766	
OTH AG			169075	55552	4836	42919	21684	37253	213915	657	
MINING & Q.			646	352	31	186	82	137	611	74	
OTHER IND.			259883	112115	7018	72814	37089	63618	227733	44649	
CAP.GOOD			7863	1695	106	1881	703	1877	16565	7634	
CONSTRUCN.			0	0	0	0	0	0	0	47632	
ELECTR			5336	2912	254	1536	674	1130	5052	13245	
EDUCATION			14403	2150	1822	8873	5102	1033	24716	85152	
HEALTH			15091	4168	4042	5321	6047	1249	18322	38886	
OTH SERV			209868	82224	1710	62507	20014	66728	344727	284346	
CAPITAL ACC			489573	0	0	2929	136534	0	754588	-115330	
ROW										940	
TOTAL	2783635	1302975	1398730	378375	29638	260230	251190	214764	1880830	726451	481590

Social Accounting Matrix for India, 1989-90 (Rs. Million) (Contd.)

	Food Grain	Other Ag.	Mining Quarry	Other Ind.	Capital Goods	Const-ruction	Elect-ricity	Educ-ation	Health	Other Serv.	Captial Account	Rest of World	TOTAL
Labour	433679	623419	53188	298442	98211	219245	37223	83296	25720	911212			2783635
Capital	101581	111831	49902	309348	64759	16615	50007	34414	9780	554738			1302975
HOUSEHOLDS													
AG. SELF(Rural)												1120	1398730
AG LAB(Rural)											90975	200	378375
NON AG.LAB(Rural)											17588	10	29638
NON AG. SELF(Rural)												200	260230
SALARIED(Rural)												200	251190
OTHERS(Rural)											64144	8970	214764
URBAN												-47140	1880830
GOVERNMENT												18050	726450
IND. TAXES	-56499	-10293	80797	40275	134451	67298	6482	6566	8946	-13121	74932	2213	481590
ACTIVITIES													
FOODGR	72088	31746	0	61477	0	0	17	1150	600	16826	13039	4375	717534
OTH AG	51319	204764	2	186314	886	18213	292	671	402	27909	41898	34796	1113357
MINING & Q.	450	300	1192	145889	897	30035	27711	0	0	6371	8576	10131	233671
OTHER IND.	47809	62281	9351	633692	111964	142375	8535	11437	37261	116537	164755	211690	2382606
CAP.GOOD	5084	4512	8593	13250	76630	21372	7686	145	123	46392	409930	20227	652268
CONSTRUCN.	19047	15059	2327	10462	4362	72	4151	1644	588	43896	459537	0	608777
ELECTR	9108	4201	7498	74115	6666	9736	53339	54	705	19582	0	0	215143
EDUCATION	0	0	0	0	0	0	0	0	0	203	0	0	143454
HEALTH	6	27	0	0	0	0	16	105	85	998	0	0	94363
OTH SERV	30127	59635	11523	324861	56743	83817	19682	3971	10153	229991	45712	68368	2016707
CAPITAL ACC												8970	1277264
ROW	3735	5875	9297	284479	96700	0	0	0	0	55173	-113820		342379
TOTAL	717534	1113357	233670	2382604	652269	608778	215141	143453	94363	2016707	1277266	342380	

APPENDIX-III

Production Function

For each sector, output is a CES production function of labour and capital.

$$Q(s)= A(s)*[\alpha(s)*L^d(s)^{(\sigma(s)-1)/\sigma(s)} + (1-\alpha(s))*K^d(s)^{(\sigma(s)-1)/\sigma(s)}]^{\sigma(s)/(\sigma(s)-1)}$$

s = 1,.....10 production sectors

$Q(s)$ = sectoral output
$A(s)$ = scale parameter
$\alpha(s)$ = share parameter
$\sigma(s)$ = elasticity of substitution
$L^d(s)$ = sectoral labour demand
$K^d(s)$ = sectoral demand for capital

Factor demands from the cost minimising behaviour:

$$L^d(s)= A(s)^{-1}*\{\alpha(s)+(1-\alpha(s))*[\alpha(s)P_L/(1-\alpha(s))P_K]^{(1-\sigma(s))}\}^{\sigma(s)/(1-\sigma(s))}$$

$$K^d(s)= A(s)^{-1}*\{\alpha(s)+(1-\alpha(s))*[\alpha(s)P_K/(1-\alpha(s))P_L]^{(1-\sigma(s))}\}^{\sigma(s)/(1-\sigma(s))}$$

where P_L = unit price of labour

P_K = unit price of capital

Zero Profit Condition for Output:

Value added and intermediate demands are fixed proportion of output.

$$Pq(s)*(1-prtax(s))*Q_S(s)= P_L*L^d + P_k*K^d +\Sigma_t IOINt,s)*Pq(t)*Q_S(s)$$

Pq(s) = Domestic producer's prices

prtax(s) = Net excise taxes

IOIN(t,s) = Input-Output coefficients

s,t = 1,....10 production sectors

Factor Market Equilibrium:

Ttoal factor endowment of household is equal to the total factor demand.

$$\Sigma_s L^d(s) = \Sigma_h L^S(h)$$

$$\Sigma_s K^d(s) = \Sigma_h K^S(h) + K_G \quad h=1,...7 \text{ households}$$

Where,
K_G = exogenously given government's capital endowments.
$K^S(h)$ = exogenously given capital endowment of household 'h'.

Disposable Income of Households

$$Y(h) = [P_L{*}L^S(h) + P_k{*}K^S(h)]{*}(1\text{-}inctax(h)) + TRNG(h) + TRNG(h)$$

Where,

inctax(h) = Income tax rate paid by the household on their factor income

TRNG(h) = Government transfer payment going to each household

REV = Total government revenue

TRNFRD(h) = Net transfer in dollar from the rest of the world to household

EXRAT = Exchange rate

Private Consumption Demand:

The LES utility function of the household for the composite goods, i.e. Cd(h,s) is maximized s.t.

$$\Sigma_s Pc(s){*}\Sigma_s Cd(h,s) + SAV(h) = Y(h)$$

The LES consumption demand function for composite goods becomes,

$$Cd(h,s) = C_0(h,s) + (\beta(h,s)/P_c(s)){*}[TotCd(h) - \Sigma C_0(h,s){*}P_c(s)]$$

Where,

Cd(h,s) = Private demand for composite goods/

$C_0(h,s)$ = Minimum consumption of good 's' of household 'h'

$\beta(h,s)$ = Marginal budget share of household 'h' for good 's'

TotCd(h)=Total consumption expenditure of household 'h'

$P_c(s)$ = Prices of composite goods for final demand

Private Savings:

Private saving is constant proportion of nominal disposable income.

$PS(h) = S_0(h)*Y(h)$

where,

$PS(h)$ = Private savings
$S_0(h)$ = Constant proportion of private saving of the private disposable income

Investment Demand:

Sectoral investment demand by origin is fixed proportion of total investment in the economy.

$Id(s) = i(s)*TINV/Pc(s)$

Where

$i(s)$ = Sectoral investment share by origin

TINV = Total nominal investment in the economy.

Total Final Demand:

$FD(s) = \Sigma_h Cd(h,s)+Gd(s)+Id(s)$

$Gd(s)$ = Sectoral Government consumption expenditure

Export Transformation:

Price of export is defined as

$Px(s)=PWE(s)*EXRAT$

And the exports face a constant elasticity demand function:

$EXPT(s) = EXPT_0(s)*(PWE_0(s)/PWE(s))^{e(s)}$

where $PWE_0(s)$ is exogenously given world export price and India's export price to the importing countries for commodity 's'. EXPT(s) is export of commodity 's' and e(s) is the export demand elasticity.

The CET function between domestically consumed and exported goods are given as

$Q_d(s)=CET(s)*[\pi(s)*EXPT(s)^{\omega(s)}+(1-\pi(s))*FDD(s)^{\omega(s)})^{(1/\omega(s))}$

$Q_d(s)$ is the demand for sectoral output. CET(s), $\pi(s)$ are technological constant and share parameters and $\omega(s)$ is elasticity of transformation. FDD(s)is the final domestic demand for domestically produce goods. Maximizing the revenue from a given output,

$Pq(s)*Q_d(s) = Pd(s)*FDD(s)+Px(s)*EXPT(s)+Pq(s)*\Sigma_t IOIN(s,t)*Q(t)$

subject to CET function gives the ratio of exports to domestic sales:

$EXPT(s)/FDD(s) =(\pi(s))/(1-\pi(s)))^{(1/(1-\omega(s)))} *(Px(s)/Pd(s))^{(1/(1-\omega(s)))}$.

Where Pd(s) is price for domestic supply for domestically produced goods and IOIN(s,t) is the demand for intermediate inputs.

Import Aggregation:

Assuming that consumers try to minimise the cost of acquiring a given amount of the composite good, the desired ratio of imports to domestic commodity is derived from first-order conditions of CES aggregation and is a function of the relative prices of domestic good and imported substitute.

The CES aggregation function is given by

$FD(s) = ARM(s)*[\sigma(s)*IMP(s)^{-\rho(s)}+(1-\sigma(s))*FDD(s)^{-\rho(s)})^{(-1/\rho(s))}$

Minimizing the cost of obtaining the unit composite good,

$FD(s)*P_c(s) = FDD(s)*Pd(s)*(1+saltax(s))+ IMP(s)*Pm(s)*(1+tm(s))$

subject to the CES function gives:

$IMP(s)/FDD(s) = (\sigma(s)/(1-\sigma(s)))^{(1/(1+\rho(s)))}$

$*(Pq(s)*(1+saltax(s))/Pm(s)*(1+tm(s)))^{(1/(1+\rho(s)))}$

FD(s) and IMP(s) are total final composite goods, and imports. $\sigma(s)$, ARM(s) and $\rho(s)$ are share parameter, scale parameter and elasticity of substitution respectively. $P_c(s)$, slstax(s) and tm(s) represent composite price, sales tax rate and import tariff respectively.

World price is converted to import price by:

$$Pm(s) = PWM(s)*EXRAT$$

Commodity Market Equilibrium:

$$Q_d(s) = Q_S(s)$$

Saving-Investment Equilibrium:

$$TS = TINV$$

Government Budget:

Tax Revenue:

$$TAXREV = \Sigma[P_L*L^S(h) + P_K*K^S(h)]*inctax(h) + \Sigma_s FD(s)*Pc(s)*saltax(s) + \Sigma_s Q_S(s)*Pq(s)*prtax(s)+\Sigma_s IMP(s)*PWM(s)*EXRAT*tm(s)$$

Total Revenue:

$$REV = TAXREV + TRNFGRD*EXRAT + P_K*K_G$$

Where, TRNFGRD is the net transfer from the rest of the world to the Government in dollar.

$$REV=REV0*\Sigma_s Q_S(s)*Pq(s)/ Q0_S(s)*Pq0(s)$$

REV0 is the benchmark revenue and Pq0(s) is the benchmark producer price of sector 's'.

Fiscal Balance:

$$GS = REV - TRNGT - \Sigma_s Gd(s)*Pc(s)$$

GS is the government saving and Gd(s) is the government consumption expenditure for commodity 's'. TRNGT is the total nominal government transfer payment to the households.

TRNG(h) = TRN0(h)*TRNGT

A fixed TRNG(h) goes as the transfer payment of government to the household 'h'.

Trade Balance:

$\Sigma_s(EXPT(s)*PWE(s)) - \Sigma_s(IMP(s)*PWM(s)) + FSD + \Sigma_h TRNFRD(h) + TRNFGRD = 0$

where FSD is the foreign savings in dollar.

Total Savings:

$TS = \Sigma_h PS(h) + GS + FSD*EXRAT$

Parameters and Exogenous Variables

1. $\sigma(s)$: elasticity of substitution

2. $\alpha(s)$: share parameters in the production

3. A(s): scale parameters in the production

4. IOIN(t,s): intermediate goods coeffients

5. $V_0(s)$: proportion of value added to the output

6. $C_0(s)$: private consumption share

7. $S_0(h)$: constant proportion of household saving of the household to disposable income

8. i(s): sectoral investment share by origin

9. $\sigma(s)$: share parameters in the import CES aggregation function

10. $\rho(s)$: elasticity of substitution between imported and domestically produced goods.

11. ARM(s): scale parameters of the import (CES) aggregation function

12. CET(s): sclae parameters of the export transformation function

13. $\pi(s)$: share parameters in the export CET function

14. $\omega(s)$: export elasticity of transformation

15. e(s): price elasticities of export demand

16. Gd(s): sectoral government "composite consumption"

17. prtax(s): net excise tax rates

18. saltax(s): sales tax rates

19. inctax(h): income tax rates

20. tm(s): import tariff rates

21. shgd(s): fixed share of real government expenditure going to household, 'h'

22. TRNFRD(h): net transfer from the rest of the world to household in dollar

23. $K^S(h)$: capital endowment with the households

24. K_G: capital endowment of the government

25. $PWE_0(s)$: world export price

26. PWM(s): world import prices

27. $EXPT_0(s)$: constant term in the export demand function

28. TINV(s): total investment in the economy

29. TRN0 (h): fixed proportion of govt. transfer to the household 'h'

Endogenous Variables

1. $P_C(s)$: prices of composite goods for domestic demand

2. P_L: unit price of labour

3. P_K: unit price of capital

4. $P_V(s)$: value added prices

5. Pq(s): producer's prices

6. Pm(s): domestic prices of imported goods

7. PWE(s): India's export price faced by the trading county

7. VA(s): sectoral value added

8. $Q_S(s)$: sectoral output

10. $L^d(s)$: sectoral labour demand

11. $K^d(s)$: sectoral capital demand

12. Cd(h,s): household sectoral consumption demand for composite goods

13. PS(h): household savings

14. Id(s): composite investment demand

15. $Q_d(s)$: total demand for output

16. Y(h): disposable income of the household

17. TAXREV: tax revenue

18. REV: total government revenue

19. FDD(s): final domestic demand for domestically produce goods

20. FD(s): total final demand

21. XD(s): total domestic demand for domestically produced goods

22. EXRAT: exchange rate

23. TGD: total nominal government current expenditure

24. Gd (s): real government consumption demand for sector, 's'

24. TS: total savings in the economy

26. FSD: foreign savings in dollar

27. GS: government saving

28. TRNG (h): government transfer payment to the household, 'h', to the revenue

29. TRNGT: total government transfer to the households

Table 1: Change in Equivalent Variation, Ginni and Factor Price of Capital (Percentage Change)

	PERCENTAGE CHANGE IN EV							TOTAL EV	GINNI COEF.	Factor Price of Capital*
	RURH1	RURH2	RURH3	RURH4	RURH5	RURH6	URB			
BASE	0	0	0	0	0	0	0	0	0.1959	0
SIM1	2.478	1.582	0.964	0.856	1.439	0.702	1.084	9.104	0.1958	-0.0283
SIM2	0.021	0.329	-1.484	-0.010	0.558	-0.394	1.199	0.218	0.1962	0.0133
SIM3	2.479	2.108	-1.550	0.823	2.347	0.030	3.074	9.311	0.1962	-0.0048
SIM4	0.912	0.612	-0.370	0.301	0.730	-0.053	-3.792	-1.659	0.1960	0.2402
SIM5	-3.870	2.010	0.552	-0.622	1.638	-0.426	3.205	2.487	0.1961	-0.7122
SIM6	4.137	-2.073	-0.534	0.678	-1.695	0.480	-3.399	-2.406	0.1958	0.7521

* Factor price of Labour (wage) is taken as numeraire.

Table 3: Change in Prices under different Alternatives (percentage change)

Sectors	SIM 1			SIM 2			SIM 3			SIM 4			SIM 5			SIM 6		
	Producer Price (PQ)	Domestic Price (PD)	Composite Price (PC)	Producer Price (PQ)	Domestic Price (PD)	Composite Price (PC)	Producer Price (PQ)	Domestic Price (PD)	Composite Price (PC)	Producer Price (PQ)	Domestic Price (PD)	Composite Price (PC)	Producer Price (PQ)	Domestic Price (PD)	Composite Price (PC)	Producer Price (PQ)	Domestic Price (PD)	Composite Price (PC)
Foodgrain	0.03958	0.02118	0.03050	-0.02417	-0.00918	-0.00828	-0.00106	0.00504	0.01591	-0.02476	-0.00687	-0.00734	-0.15609	-0.13987	-0.13974	0.16831	0.14938	0.14973
Other Agriculture	0.03719	-0.00095	0.01672	0.02265	-0.00236	-0.00075	-0.00092	-0.00669	0.01371	-0.02317	-0.00470	-0.00560	-0.13531	-0.16861	-0.16799	0.14620	0.17707	0.17736
Minig & quarrying	0.03965	-2.50524	1.00359	-0.02503	-0.58680	0.05828	-0.00223	-3.47408	1.10162	-0.02628	-0.04120	-0.07057	-0.32788	-0.28002	-0.13537	0.19465	0.14641	0.19465
Manufacturing Industries	0.49366	-0.31893	-0.44539	-0.29341	-0.64418	-0.39897	-0.00201	-1.38533	-1.10527	-0.29453	-0.39135	-0.28912	-0.27477	-0.43948	-0.39298	0.40868	0.48039	0.40868
Capital Goods	0.16351	0.05668	0.39560	-0.09808	-0.09255	-0.03653	-0.00193	-0.09965	0.33381	-0.09916	-0.09645	-0.09032	-0.27754	-0.25960	-0.22309	0.29222	0.28496	0.26222
Construction	0.14482	0.15586	0.15586	-0.08653	-0.09297	-0.09297	-0.00123	-0.00116	-0.00116	-0.08721	-0.09361	-0.09361	-0.17547	-0.16426	-0.16426	0.19043	0.19043	0.19043
Electricity	0.04142	-1.09786	-1.09786	-0.02621	0.67526	0.67526	-0.00242	-0.00500	-0.00500	-0.02757	0.67191	0.67191	-0.35550	-0.78498	-0.78498	0.71501	0.71501	0.71501
Education	0.03772	0.03773	0.03773	-0.02335	-0.02335	-0.02335	-0.00146	-0.00146	-0.00146	-0.02417	-0.02417	-0.02417	-0.21474	-0.21467	-0.21467	0.23088	0.23088	0.23088
Health	0.21836	0.22064	0.22064	-0.13035	-0.13169	-0.13169	-0.00169	-0.00169	-0.00169	-0.13129	-0.13264	-0.13264	-0.23968	-0.23944	-0.23944	0.27701	0.27001	0.27700
Other Services	0.03369	0.00181	0.06692	-0.02120	0.02568	0.03025	-0.00181	0.04412	0.11693	-0.02222	-0.00158	-0.00510	-0.26598	-0.27254	-0.26515	0.28484	0.28926	0.28484

D. The Impact of the Opening up of Nepalese Economy on Income Distribution and Poverty: A General Equilibrium Analysis

The Impact of the Opening up of Nepalese Economy On Income Distribution and Poverty

A General Equilibrium Analysis

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TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

1.1 Background

Nepal's development has been affected by a number of long-standing constraints. Its resource endowments (except for its scenic beauty and hydropower potential) are limited. Given its rugged terrain and land-locked location, Nepal has also inherited serious competitive disadvantages in comparison with neighboring countries in terms of higher transport and investment costs, a fragmented domestic market and limited access to the outside world. The country's social and economic infrastructure remains undeveloped and highly inadequate; while a poor administrative system, weak institutions and a high rate of population growth have been major impediments to development. Economic growth over the past two decades have averaged about 4.5 percent per annum, with per capita income rising by about 2.0 percent per annum. Nepal's level of income (US$ 210 per capita) is one of the lowest in the world; more than half of the population survives on less than one dollar a day. Nepal's economic growth is narrow-based and has low employment intensity, with the result that income distribution is uneven. Overall, low rate of income growth, skewed income distribution, and particularly, deteriorating terms of trade of the agricultural sector vis-a-vis non-agricultural sectors have intensified poverty.

Nepal started development planning since 1956. In the early years, the agricultural and infrastructure sectors were given top priority in almost all development plans. However, per capita income did not increase because the rates of economic growth remained below the rates of population growth throughout the '70s. The situation improved marginally in the '80s and '90s. The marginal growth in per capita income was highly skewed in favor of the non-agricultural sector and urban areas. Gaps between the objectives and their realization, program formulation and their implementation, and program implementation and their effectiveness lie behind this policy failure. Since implementation of the various development plans could not ensure a minimum quality of life for the people, the Basic Needs Approach to development planning was initiated in the `80s. The Seventh Plan (1986-90) was formulated with this approach. The basic needs identified by the plan were food, clothing, fuelwood, drinking water, primary health service and sanitation, basic education and skill and minimum rural transportation facility. To attain these objectives, the plan laid emphasis on development of agriculture, water resources, industries, trade and tourism.

According to the National Planning Commission, about half of the population live below poverty line defined as a daily subsistence expense of six rupees per capita and below at 1989/90 prices[1]. About 90 per cent of the Nepalese live in rural areas and more than 80 per cent of them depend on agriculture for their livelihood. Manufacturing accounts for just five per cent of the value added in the economy. Further, there is a wide variation in the level of development among the three ecological regions, on the one hand, and among the five development regions, on the other.

After the people's movement of 1990 which restored multi-party democracy, the Eighth Plan adopted a market-oriented economic policy aiming to reduce incidence of poverty from 49

[1]National Planning Commission (NPC), "The Eighth Plan, 1992-97", Kathmandu: NPC, Nepal, 1992.

percent of the population in 1992 to 42 percent by the end of the plan (1997). But no specific measures were taken to this end. Instead, adoption of market-oriented liberal economic policies has had an adverse effect on poverty. The withdrawal of subsidies, mass retrenchment of civil servants, wage freeze, deregulation of administered prices and upward revision in the prices of the goods and services delivered by public enterprises have had an adverse effect on the situation of poverty. Although overall growth rate has remained in line with the objective, the distribution of income has been more adverse. This is evident from the deteriorating terms of trade of agriculture on which 80 percent of the population subsists, deteriorating levels of real wages, and high rates of inflation. The rate of inflation averaged 10.3 percent during the plan period due mainly to faster price rises on non-agricultural goods which left an adverse effect on agricultural households and fixed income (wage) earners. The approach paper to the Ninth Five Year Plan (1997-2002) prioritise poverty alleviation as its first objective. The Plan aims to lower the national incidence of poverty from 45 percent in 1997 to 32.5 percent by 2002, and eventually to 10 percent by 2017. Among the proposed sets of programs to achieve this objective are effective implementation of the land reform program, provision of subsidized agricultural inputs, improvement in agricultural marketing system and employment promotion.

Besides, the development plans aimed at generating more employment opportunities by improving cropping intensity in agriculture, promoting off-farm activities, developing an industrial base and providing institutional credit so as to improve the level of income and reduce poverty. Yet employment growth has been slow during this period and employment elasticity of the economy remained low (about 0.34), implying that each 3 percent growth could generate only one- percent employment growth. Sectional interventions including the programs for Food for Work, Targeted Credit, and Integrated Rural Development added few employment opportunities. While labor demand has been growing at around two percent per annum during the last two decades, the labor force has grown by three percent per annum on the average. This has intensified both unemployment and underemployment.

In the process of economic liberalization and restructuring, a number of reform measures have been introduced since the mid-'80s. Accordingly, there has been industrial de-licensing, trade liberalization, incentives for foreign investment, some privatization and general pursuit of economic and administrative environment that is conducive to private sector participation in the economy. These reforms have given mixed results to the economy in terms of growth and equity. One of the positive aspects is that macrostability has broadly been attained with a favorable balance of payments, single digit inflation rate and fiscal restraint. However, many more issues have cropped up as a trade-off to this stability. First, economic growth has remained narrow-based; it has failed to create adequate employment opportunities and to alleviate poverty. Second, the terms of trade of agriculture have deteriorated because price deregulation affected much more the non-agricultural products. Third, the workers' share in income has deteriorated, as real wages have not improved. Fourth, civil service reform and privatization have propelled mass retrenchment of public sector. Fifth, the withdrawal of subsidies and price of basic consumption items of the poor, more than increase in their income, resulting in a deteriorated level of real consumption. Sixth, opening of the economy without enhancing the competitiveness of domestic industries has shaken the industrial base, and industrial capital has eroded. Seventh, emergence of market force has displaced people lacking skill, entrepreneurship and landed property, has added hardship to women and children and eroded the social fabric. In addition, eight, regional imbalances in development have widened due to the skewed development of the market and the investment left to be driven by the market.

Financial liberalization initiated since the mid-'80s was expected to support poverty alleviation and human development through enlarging access to credit for the people who have no physical or financial assets. But, this has not happened. *First*, banks have widened the spread between lending and deposit rates and hence made credit more expensive in relation to the return for deposit. *Second*, banks have closed or merged loss-making branch offices situated in the rural/remote areas and thus deprived people from banking services. *Third*, banks have started resorting to wholesale banking, thus depriving the masses even in the urban areas from banking services. *Fourth*, banks overlooked their commitment to channel at least 12 percent of the total credit to the priority sector and 3 percent to the deprived sector. The squeeze on rural credit, which has a direct bearing on poverty alleviation, has aggravated the problem of joblessness and wastage of human labor. In addition, *fifth*, agriculture and industry continue to remain deprived of institutional credit despite a large extent of financial deepening.

Fiscal restructuring in the process of liberalization and adjustment has had a significant implication for human development. Past experiences shows a severe budget squeeze in the social sector with the adoption of adjustment programs (NPC 1994). This has had an adverse effect on human development. Besides, most of the loan associated with structural adjustment went to economic sectors and only about 10 percent of the loan have gone for the social sector. Subsequently, government investment on social development through external sources remained low.

Beside government sponsored poverty alleviation programs, there are large numbers of International Non-governmental Organization (INGOs), National Non-governmental Organizations (NGOs) and traditional self-help groups and self-help organizations. The available scattered information suggest that these programs might have had a better impact on poverty alleviation albeit in limited areas, than government sponsored programs.

1.2 Objectives

The objective of this report is to sketch out the construction of real sector General Equilibrium Model of Nepal suitable for the general policy analysis of the country. In particular, the report will capture the impacts of opening up of the Nepalese economy and trade liberalization on income distribution at the household group's level: non-poor households and poor households.

1.3 Organization of the Report

The report is organized into six chapters. Chapter II reviews the Nepalese economy. Chapter III reviews the trade regime and external shocks. Chapter IV presents income distributional concerns. Chapter V presents Nepalese SAM. Chapter VI presents the general equilibrium structure of the economy. Chapter VII presents the general equilibrium impacts of trade liberalization and its income distributional effects among the poor and non-poor household groups.

CHAPTER II

OVERVIEW OF NEPALESE ECONOMY

2.1 Macro-economic Situation

2.1.1 Structure and Trends in GDP Growth

During the 1970s, GDP growth averaged at 2.1 percent per annum in contrast to population growth of 2.6 percent per annum, resulting real per capita income decline of 0.5 percentage point. As the agricultural sector grew by just as 0.5 percent, per capita agricultural income declined by 2 percentage points. During the 1980s, growth rates in both the agricultural and non-agricultural sectors remained higher than the rate of population growth. Therefore, per capita income in the agricultural and non-agricultural sectors grew by 2.3 and 2.9 percent, respectively. During the 1990s, although the growth in per capita income has remained 2.9 percent on average, per capita agricultural income has recorded a decline.

Table 2.1: Composition and Trends of Gross Domestic Product

Sectors	Sectoral Shares		Growth Rates
	1991/92	1996/97	1992-96
GDP at factor cost			4.9
Agriculture, Irrigation and Forestry	44.89	41.02	3
Non-Agriculture	55.11	58.98	6.3
Industry, Mining and Quarrying	8.4	9.22	6.8
Electricity, Gas and Water	0.79	0.8	5.2
Construction	9.53	8.12	3.9
Trade, Hotel and Restaurants	10.65	11.81	7.1
Transport and communication	6.81	8.03	8.4
Real Estate and Dwelling	9.52	9.91	5.7
Social Services	9.42	10.08	6.3
GDP at producer prices			5.1

Source: National Planning Commission

2.1.2 Foreign Trade

Nepal's foreign trade has been characterized by a large current account deficit. Imports of consumer goods, petroleum products, chemical fertilizers, and industrial raw materials have been steadily increasing; while exports of traditional items, especially agro-based products, have been on the decline. Hand-knitted woolen carpets, ready-made garments, pulses, handicrafts and leather goods are the only export items of significance. Unless serious attempts are made to identify new exportable products, develop specific market niches, and support market research, the trade deficit may deteriorate even further.

In an attempt to improve the performance of the foreign trade sector and to enhance its earnings capacity, the government has been pursuing a new set of trade policies consistent with its overall economic objective of creating an open, liberal and market-oriented economy. The Nepal Rupee was devalued in 1991 and was made convertible on current account in March 1992, and subsequently, full convertibility on current account was introduced in February 1993. Concurrent with this arrangement, import licensing was eliminated for all but six items. The foreign exchange required for imports of non-restricted items could be obtained from commercial banks (CBs) at market rates without any government controls. As per the trade treaty signed with India in 1991, Nepalese products containing domestic and/or Indian material contents of 50 per cent or more can be exported to India duty-free on the basis of certificate or origin issued in Nepal.

The country's dependence on trade with India has decreased over the years. However, the trade gap with India continues to be significant. While there was significant increase in imports from India during the last two years mainly due to the new trade agreement with that country, exports to India was sluggish during the same period. During a period when Nepalese exports to third countries were booming, it was sluggish to India mainly because of India's adoption of liberal, market-oriented policies and revaluation of Nepalese currency vis-a-vis the Indian Currency. As a result, though the share of trade with India was only 28.5 per cent in 1991/92, 54 per cent of the trade deficit of Nepal was accounted for India.

There has been a significant growth in export to third countries during the last two years. This export growth, however, is almost exclusively due to three items viz. woolen carpets, ready-made garments and pulses. In 1991/92, woolen carpets accounted for 57 per cent and ready-made garments for 26 per cent of Nepal's third country exports. Another nine per cent was accounted for by pulses. Thus, more than 90 per cent of Nepal's third country exports are just three items. Furthermore, Germany holds over 80 per cent of the carpet export market and the U.S.A. is the main market for apparels. This puts Nepali exports in a tight spot. In order to reduce reliance on limited markets and products, serious thought need to be given in expanding the number of exportable products and destinations.

2.1.3 Balance of Payments Situation

Nepal's current account balance is always a structural problem, and it posses problems unless the country diversifies its exports meaningfully. The budget and balance of payments remain dependent on foreign assistance, with government revenues financing only about 60 percent of total expenditures and export earning covering barely 25 percent of merchandise imports. Table 1 presents the current account and fiscal deficits during the period 1980/81-1996/97. Nepal's trade deficit in the 1980/81 was around 10.4 percent of GDP, and it increased to 15.4 percent in 82/83, declined thereafter and again peaked to 14 percent in 1888/89, and declined thereafter, and again increased 16.9 percent in 1993/94, 21.9 percent in 1994/95 and 23.8 percent in 1995/96. The current account deficit, which was only 1.1 percent of GDP in 1980/81, worsened to the tune of 9.9 percent by 1995/96. The fiscal deficit soared during 1984/85 to the tune of 12.7 percent of GDP, and in 1988/89 to the tune of 12 percent of GDP, it has been brought down to the tune of 6-7 Percent through the stabilization and structural adjustment programs launched in Nepal during 1986-1995 by the IMF and World Bank.

Table 2.2: Selected Trade and Fiscal Indicators as a percent of GDP

Year	Trade Deficit	C/A Deficit	Fiscal Deficit	Government Revenue	Regular Expenditure	Development Expenditure
1980/81	-10.4	-1.1	-6.4	8.8	5.2	10.0
1981/82	-11.1	-1.3	-8.9	8.6	5.5	12.0
1982/83	-15.4	-5.0	-12.7	8.4	6.3	14.8
1983/84	-12.2	-3.4	-10.4	8.6	6.0	13.1
1984/85	-11.3	-4.2	-10.3	8.8	6.8	12.4
1985/86	-11.8	-4.6	-9.9	8.7	6.9	11.7
1986/87	-13.0	-4.8	-9.3	9.8	7.0	12.1
1987/88	-13.3	-6.3	-9.5	10.0	6.6	12.9
1988/89	-14.1	-7.4	-12.4	9.1	7.1	14.4
1989/90	-13.2	-7.7	-10.9	9.3	7.1	13.0
1990/91	-13.7	-8.2	-11.3	9.2	6.8	13.8
1991/92	-12.6	-7.0	-6.1	9.3	7.0	11.4
1992/93	-13.3	-6.0	-9.9	9.2	7.3	11.7
1993/94	-16.9	-4.2	-7.6	10.2	6.7	11.1
1994/95	-21.9	-5.6	-7.0	11.7	9.2	9.4
1995/96	-23.8	-9.9	-7.9	11.6	9.1	10.4

Source: HMG/Nepal, Economic Survey, 1997.

2.1.4 Fiscal and Monetary Developments

Nepal's economy passed through difficult situation in the early 1980's. Real GDP growth rate during the period fluctuated erratically. In 1982/83 it had dropped by a magnitude of three percent. Fiscal policy was so expansionary that total expenditures exceeded one-fifth of the GDP. Revenues amounts to only around one-twelfth of the GDP. Consequently budget deficit jumped up to over 12 percent of the GDP (in 1982/83). When foreign grant is substracted from the resources, budget gap amounts to 15.5 percent of the GDP. Development expenditures had gone up so high relative to revenues that share of such expenditures financed by revenue surplus (total revenue less regular expenditure) dropped to below 17 percent. The resultant domestic resources gap spilled over into the external gap. In 1982/83, for the first time, Nepal experienced a shortfall in its foreign exchange reserves amounting to nearly two percent of the GDP. As an outcome of excess liquidity emanating from enlarged budget deficits, current account deficits widened to 6.0 percent of the GDP. The enlarged budget deficit was financed largely by borrowing from the banking system. The outcome was a heavy expansion in narrow money supply (M1), which in 1982/83 had increased by as high as 20.4 percent. Obviously, inflation rate as measured by GDP deflator, jumped up to 12.3 percent in 1982/83 on top of a 9.4 percent increase in 1981/82. In the subsequent two fiscal years 1983/84 and 1984/85, real growth rates rebounded encouragingly and expenditures dropped in proportion to GDP.

The revenue performance did not well respond to increased GDP. As such, budget deficits although declined from 12.3 percent, in both the years it still remained above 10 percent of GDP. Naturally, the pace of expansion of domestic credit persisted due mainly to increased banking sector credit to the government. Largely because of downward shifts in the trade gap to GDP ratio, current account deficits fell in proportion to the GDP. As foreign capital nflows did not offset the amount of current account gap, economy continued to experience he fall in its foreign exchange reserves up to 1984/85. Inflation rate slowed down, but still emained higher in comparison to Nepal's trade partners. Insufficient adjustments in nominal exchange rate resulted in appreciation of the Nepali currency. Thus, it was in this context of budget gap as well as external current account gap accompanied with slower growth and higher inflation rates throughout the early 1980's Nepal's authorities felt the need for introducing adjustments in its economic policies.

2.2 Economic Stabilization and Structural Adjustment Program

2.2.1 Economic Stabilization Program

Adverse development in the economy in the sphere of growth rate, huge budgetary and external current account gaps, excessive liquidity and monetary expansion, higher pace of inflation and consequent real appreciation of the currency in the early 1980's called for rethinking in the strategy of national economic management. Nepal responded to these challenges by adopting economic stabilization program in 1985. The major components of this program were correcting distortions in the real exchange rate by adjusting nominal rate and restraining the budget deficits, primarily through the controlling of public expenditures.

Following demand management policy, budget deficits decreased from over 10 percent of GDP to 9.7 percent in 1985/86 and further down to 9.1 percent in 1986/87. The share of internal loans in deficit financing dropped drastically from around 40 percent in 1984/85 to 30 percent in 1986/87. Similarly, the extent of the development expenditures financed from revenue surplus increased from 17 percent in 1985/86 to 25 percent in 1986/87. In the external sector, current account gap increased from 4.2 percent of GDP in 1984/85 to 4.5 percent in 1985/86 and to 4.8 percent in 1986/87. However, foreign capital inflows, both official and miscellaneous, more than offset the current account imbalance by 1.1 percent of GDP in 1985/86 and one percent in 1986/87. Thus, the depletion in foreign exchange reserves experienced continuously for three years (1982/83-1984/85) was finally reversed in 1985/86.

2.2.2 Structural Adjustment Program

Statistics suggest that demand management policy, on the whole, resulted in improved performance particularly in regard to fiscal deficit and foreign exchange reserves. Even though 1985/86 experienced unprecedented monetary expansion of 28.3 percent, the major source of such expansion was balance of payment (BOP). With this experience, Nepal introduced Structural Adjustment Program (SAP) in 1987 with the Fund-Bank support. The major objective of SAP was to foster economic growth while maintaining macroeconomic stability by correcting structural rigidities in the supply side of the economy. SAP which included Structural Adjustment Loan (SAL) from the World Bank was to be implemented in a three year's period of 1987/88 to 1989/90. The program was designed to:

i. sustain the real GDP growth at 4 to 5 percent per year,
ii. contain external current account deficit (excluding grants) to about eight percent of GDP on average, and
iii. achieve an overall surplus in the BOP.

2.2.3 Program Components of SAP

The above targets were to be achieved by adopting the following policies and measures.

i. ***Public Sector Policies***. It consisted of fiscal and public enterprise policies. In the ***fiscal policy*** net domestic financing of budget deficits (internal borrowings from the banking system) was to be gradually reduced to one percent of GDP in 1990/91 from 1.7 percent in 1985/86. Revenue mobilization was set to increase by 0.7 percentage point of GDP every year. In the expenditure front, growth of regular expenditures was to be contained and that of development expenditures raised in relation to the GDP. Public enterprise policy was targeted to increase the profitability of non-financial enterprises by reviewing the sale prices of their products and their restructuring.

ii. The thrust of monetary and credit policy broadly included the compression of domestic credit expansion, particularly to the public sectors, and financial sector reforms. The later target was to be achieved by commencing treasury bills auction and developing secondary market for them. Further, aspects of financial sector reforms were to diversify maturity structure of government securities, phasing out of central bank's automatic loans to commercial banks against government securities and reduction of arrears in government guaranteed loans. Restructuring of government-owned banks and development of healthy competitive environment in the financial system included further reforms in the financial sector.

iii. External policy was to be geared at containing increase in debt servicing and strengthening external position by better exchange rate and external borrowing management.

iv. Sectoral policies emphasized improved management of enterprises and ensured efficient supply of inputs. This included reducing the extent of protection, extension of OGL list and strengthening the capability of Nepal Electricity Authority to undertake the construction and management of large hydroelectricity projects such as Arun III.

2.2.4 Macroeconomic Impacts of SAP

Full implementation of SAP got prematurely aborted owing to Nepal's prolonged trade impasse with India in 1989 and subsequent people's movement for restoration of democracy. However, between 1987/88 and part of 1989/90, SAP was in force. The impact of SAP can be seen from the following table:

Table 2.3: Macroeconomic Indicators of Nepal, 1985/86 - 1989/90

ndicators	1985/86	1986/87	1987/88	1988/89	1989/90	Program Target
Real GDP growth	4.7	2.0	7.0	5.4	4.9	4-5 percent
n percent of GDP						
1. External current account deficit (excluding grants)	7.2	6.9	8.1	8.9	8.8	about 8% on average
2. BOP	1.1	1.0	3.1	0.1	2.7	achieve an overall surplus
3. Net domestic financing of budget deficits/	1.7	1.8	1.1	1.5	1.5	Reduce to one percent in 1990/91
4. Revenue	8.7	9.8	10.1	9.1	9.3	Increase by 0.7 percentage points every year
5. Total expenditures	18.4	18.8	19.3	21.0	19.7	
5.1 Regular	6.7	6.8	6.4	6.6	6.7	Reduce
5.2 Development	11.7	12.1	12.9	14.4	13.1	Increase
6. Budget deficit	9.7	9.1	9.2	11.9	10.1	
7. Budget deficit (excluding grants)	11.9	11.2	12.1	13.9	12.4	

Source: 1 Policy Framework Paper of IMF and various tables of Economic Survey 1995/96 of MOF, HMG/N.
1/ Government's borrowings from the banking system (Econ. Survey table 8.1)

Looking at the table it is clear that growth rate has out-performed the target. BOP surplus has remained satisfactory except for heavy slowdown in reserve accumulation in 1988/89. Except in 1988/89, net domestic financing of budget deficits broadly tends towards the target. Revenue performance has remained poor. Expenditures appear to be downward sticky. However, increase in ratio of development expenditures to GDP is higher than that for regular expenditures. A criteria to examine the sustainability of expenditures is the amount of revenue surplus (revenues less regular expenditures). Such surplus had financed as much as 28 percent of the development expenditures in 1987/88. This share nose-dived to 17 percent in 1988/89 and finally reversed back to 20 percent in 1989/90. This is still far below 1987/88 level of 28.4 percent. Poor revenue performance and inelastic nature of regular expenditures are the primary reasons explaining weakening revenue surplus. In the external sector, the current account ratio is not far off the target. Nevertheless, in each successive years, current account ratio is moving away from the target by widening margin. To conclude, other than the growth rate, the macroeconomic scenario reflects much scope for moving towards the SAP target. In the terms of growth rate, since the growth stimulus has originated from the agriculture sector, the credit attributed to SAP needs rethinking. It is because, agriculture responds more to weather and climatic conditions than to macroeconomic policy environment.

2.2.5 Post-SAP Development

In the post-SAP period Nepal-India trade impasse was resolved. Multi-party democracy was restored in April 1990 after 30 years of party-less governance. A coalition government of all political parties jointly struggling for restoration of democracy was formed. The Interim Government following the popular movement successfully drafted the constitution and held general election. The general election returned Nepali Congress into power in May 1991. The new popularly elected government began liberalizing the economy by widening the OGL list, rationalizing tariffs, revising the prices of government controlled public utilities, deregulating the financial sector by freeing various interest rate, privatization of state enterprises and by freeing exchange rate determination to the market forces.

Real growth rate continued to increase satisfactorily due mainly to the resilience in the non-agricultural sources rather than agriculture. Revenue increment could not keep pace with pressures on aggregate expenditure resulting in increased budget deficit. However, net domestic financing of budget deficits continued to decrease in relation to the GDP. In the external sectors, current account deficits (excluding grants) continued to remain over eight percent of the GDP.

Table 2.4: Post-SAP Macroeconomic Scenario of Nepal (in percent of GDP)

Indicators	1989/90	1990/91	1991/92
Real GDP growth rate	**4.9**	**6.4**	**4.6**
In Percentage of GDP			
1. Current a/c deficits (excl.grants)	8.8	9.6	8.1
2. Balance of payments surplus	2.7	3.6	2.3
3. Net domestic financing of budget deficits	1.5	1.1	1.0
4. Revenues	9.3	9.2	9.3
5. Total expenditures	19.7	20.3	18.2
5.1 Regular	6.7	6.5	6.8
5.2 Development	13.1	13.8	11.4
6. Budget deficit	10.1	11.0	8.9
7. Budget deficit (excl. grants)	12.4	12.9	10.0

From the table it is evident that government's budgetary operations worsened in 1990/91 and there are signs of recovery in the following fiscal year. Net domestic financing of budget deficits, however, is continuously declining over the years. In the external sector, there is a remarkable progress in BOP. The reverse scenario is observed in external current account imbalances. Growth rate fell to long run trend of 4-5 percent in 1991/92 after a much better performance 1990/91. To sustain the growth rate and to make long run improvement in the external and fiscal fronts there still existed sufficient scope for continuing with the structural adjustments that was aborted in 1989/90.

2.2.6 Enhanced Structural Adjustment Facility (ESAF)

Nepal entered into ESAF agreement with the Fund in October 1992 for a period of three years. The support of the IDA and AsDB was also to be synchronized with ESAF. ESAF was more comprehensive than SAP in the sense that this program also covers issues beyond fiscal-monetary-external sector policy domain. ESAF charts extends as far as to reforms in the civil service, human resource developments including poverty alleviation, and environment. The analysis here will be confined to macroeconomic developments.

The major macroeconomic targets of ESAF follows. Real GDP was targeted to grow at the rate of five percent a year initially which was later revised to six percent in 1993/94 and 4.2 to 4.8 percent every year thereafter. Consumer price inflation was set to increase at the rate of eight percent a year which was later lowered down to five percent. Net domestic financing of budget deficit was to be lowered down to 0.7 percent of GDP and ultimately down to 0.6 percent by 1995/96. External current account deficit was targeted to remain under eleven percent of the GDP by 1995/96. Similarly, fiscal deficit (after grants) would have to be brought down to six percent of GDP in 1993/94 and was set to increase to eight percent by 1995/96. Revenue was targeted to increase by 0.5 percentage points of GDP every year. The actual outcome is given in Table 2.5.

Table 2.5:Macroeconomic Developments, 1991/92-1995/96

(in percent)

Indicators	1991/92	1992/93	1993/94	1994/95	1995/96
1. Real GDP growth rate					
1.1 Target	-	2.9	6.2	4.2-4.8	4.2-4.8
1.2 Actual	4.6	3.3	7.9	2.9	6.1
2. Consumer Price Inflation					
2.1 Target	-	10.8	8.0	7.0	6.0
2.2 Actual	21.0	8.9	9.0	7.7	9.2
In percent of GDP					
3. Fiscal deficit (before grants)					
3.1 Target	-	10.8	8.6	8.5	9.6
3.2 Actual	10.0	11.8	8.5	8.7	9.8
4. Net domestic financing of budget deficits					
4.1 Target	-	3.1	1.3	0.7	0.6
4.2 Actual	1.0	0.6	0.6	0.6	0.3
5. Revenue					
5.1 Target	-	9.9	10.6	11.2	11.7
5.2 Actual	9.3	9.2	10.2	11.7	11.8
6. External current account deficit (excl. grants)					
6.1 Target	-	8.7	9.0	9.9	10.7
6.2 Actual	8.1	8.2	5.8	8.9	11.8
7. Total Expenditures	18.2	18.7	17.5	18.6	19.5
7.1 Regular	6.8	7.0	6.5	9.2	9.2
7.2 Development	11.4	11.8	11.1	9.4	10.3

Source: HMG/N, MOF Economic Survey 1995/96 (various tables)
IMF's Policy Framework Paper.

On the whole, the performance of various indicators broadly tend towards the target. Except 1994/95, a poor weather year, growth performance has exceeded the target by a respectable margin. Consumer price inflation has remained off the target, with the actual performance deviating by 3.2 percentage points above the target in 1995/96. Fiscal deficits deviated from the target by a wider margin in 1993/94 and narrowed down in subsequent years. Net domestic financing of budget deficits (defined as government's internal borrowing from the banking system) has consistently out-performed the target. However, in terms of total internal loans (from banking plus non-banking sectors), the actual performance falls below the target in 1994/95. Such divergence widened further in 1995/96. Revenue mobilization has been satisfactory. The deviation from target narrowed down from 0.7 percentage point in 1992/93 to 0.4 percentage point in 1993/94. In the following two years revenue have exceeded the ESAF target. External current account deficits (excluding grants) though well above eight percent of GDP have remained well within the ESAF target until 1994/95. In 1995/96 however, the projected deficits in current accounts is likely to exceed the ESAF target by 0.4 percent of the GDP.

Total budgetary expenditures which had declined from 18.7 percent of GDP in 1992/93 to 17.5 percent in 1993/94, increased to 18.6 percent in 1994/95 and further up to 19.5 percent in 1995/96 due mainly to mounting pressure from the regular budget. If this trend continues, development expenditures will fall behind regular expenditures in the near future.

At the policy level, import licensing was completely withdrawn and Nepali Rupee was made fully convertible in current account transactions in July 1993. Customs duty and sales tax have been rationalized by compressing the rate as well as streamlining the rate structures. In line with the structural adjustment program, 13 public enterprises were privatized by 1994. Selling prices of government controlled commodities and services such as chemical fertilizer, sugar, dairy products, petroleum products, electricity and drinking water have already been revised upward in stages. Licensing procedure for banks and financial institutions have been simplified. The entry conditions have been eased considerably. Their entry is now governed by capital adequacy and other prudential norms. Statutory liquidity ratio, other than cash reserves has been withdrawn. Interest rate is governed by treasury bill auction rate and central bank's rediscount rate.

2.3 Sectoral Production Structure

Nepalese economy is a subsistence agricultural economy. Most of the agriculture is rain-fed and there are pronounced regional attributes in the production process. There are three distinct ecological belts of mountain, hills and Terai. The production structure has changed in the recent years, the share of agriculture has declined while the share of manufacturing and services have increased. Agriculture growth in the present decade has averaged only 2.3 percent per annum which is less than the rate of population growth rate of 2.5 percent a year.

2.3.1 Agricultural Sector

Agriculture, which accounts for more than 80 per cent of employment, contributes only 42 percent to GDP. It is characterized by heavy dependence on weather and very low productivity. The Hills and the Mountains together occupy two-third of the land area of the country, but account for one-third of the cultivated area and 60 per cent of the population of the country. Therefore, majority of the farmers has small holdings. According to the 1991/92 Census of Agriculture, nearly 70 per cent of the total number of holdings are of less than one hectare size and account for about 31 percent of the total cropped area. Vast majority of farms in the Hills and the Mountains are of marginal size. Developing the agriculture of the country largely means covering these small and marginal holdings into economically viable and profitable units.

Agriculture sector broadly covers food crops, cash crops, fruits and vegetables, other crops, livestock, fisheries and forestry. Major food crops of Nepal are paddy, maize, wheat, millet and barley and major cash crops are potato, sugarcane, tobacco, jute and oilseeds. Other crops comprise pulses, spices, tea, cotton and cardamom. Livestock includes production of milk, meat, eggs, wool, hides and skins etc. Forestry includes production of timber, fuel wood, medicinal herbs and other forest products.

The share of Agriculture sector to GDP has undergone changes during the last ten years. Within agriculture, the agriculture proper (food grain, cash crops, fruits and vegetables and other crops) accounts for 61 percent of Agricultural GDP. Noticeable changes are the decrease in the share of food crops and cash crops and increase in the share of fruits and vegetables. During 1994/95, fruits and vegetable accounted for 16.2 percent of AGDP. This is a noticeable changes in the last few years.

Table 2.6: Gross Output, Intermediate Consumption and Gross Value Added, 1994/95

(Rupees in Million at Current Price)

Sub-sector	Gross Output	Intermediate Consumption	Gross Value Added	Percentage
a. Agriculture Proper	66717	14486	52231	61.0
Food Grains	36583	9384	27199	31.8
Cash Crops	8066	2019	6047	7.1
Fruits and Vegetables	16153	2246	13907	16.2
Other Crops	5915	837	5078	5.9
b. Livestock	27434	3094	24340	28.5
c. Forestry	8262	132	8130	9.5
d. Fisheries	890	22	868	1.0
Total	103303	17734	85569	100.0

Source: CBS,HMG/ Nepal, National Accounts of Nepal, 1997

A major source of agricultural growth during the past two decades was area expansion, Increasingly marginal lands, especially in the Hills and the Mountains, were brought under staple food-crops. Index of area under food-crops, with 1974/75 as base year,has increased to 135 by 1992/93. The index of yield, however, has shown a decline to 96 during the same period. this, of course, is partly due to the poor monsoon conditions during 1992/93. To get a more stable picture a comparison of the figures for the triennium ending 1976/77 and 1992/93 will be more appropriate. The increase in area index is from 101.7 to 138.4 during this period whereas the corresponding increase in yield is from 98.9 to 103.1 only. Therefore, almost the entire increase in the production index from 100.5 to 142.9 has come about through area expansion. Since the scope of further expansion of area is limited, the only feasible option for increasing agricultural production now is to intensify agriculture, which will raise productivity per unit area. A number of studies in the past have indicated the potential for a significant improvement in productivity through appropriate policy thrust supported by technical backstopping and a reliable supply of farm inputs, including credit.

2.3.2 Production Characteristics of Agriculture

2.3.3 Food Crops

Paddy, maize, wheat, millet and barley are the major food crops of Nepal occupying about 90 percent of the total cropped area and accounting for 31.8 per cent of agricultural GDP as of 1994/95. Food crops are also the most important source of human nutrition in Nepal as they supply 80 percent of calorie needs. Maize is the principal crop in the hills and mountains. Millet and barley are grown mostly in mountain and some part of hill areas. In the terai, paddy is the most important crop followed by wheat and maize.

Data on cropped area show that there is increase in the area of paddy, wheat, maize, millet and barley by 2.8, 10.3, 4.5, 30 and 30 percent respectively during last six years. Similarly, the increase in production of paddy, wheat, maize, millet and barley is 2.2, 21, 8.1, 21.5 and 24 percent, respectively, during the same period. However, the yields of all the food crops, remain almost stagnant except for wheat during 1990/91 to 1995/96. In case of wheat, yield has also increased by 14 percent. Therefore, the increase in production of food crops other than wheat is mainly due to the increase in the area under crops.

2.3.4 Cash Crops

The major cash crops cultivated in the country are sugarcane, oilseeds, tobacco, potato and jute. while the cereals account for about 90 per cent of the cropped area, the cash crops occupy less than ten per cent of the area. They, however, play an important role in the economy by providing raw materials for the major industries and as foreign exchange earners. The index of area under cash crops increased from 99.7 for the triennium 1976/77 to 135.9 for the triennium ending 1992/93. The corresponding increases in production and yield are from 101.6 to 313.7 and from 102.2 to 230.7, respectively. It is, thus, evident that, unlike in the case cereals, the major contribution to production increase of cash crops came from increase in productivity rather than from area expansion. The area under sugarcane more than doubled during the period under consideration while there was about 50 per cent increase each in the case of oilseeds and potato. Area under tobacco, oilseeds showed low and unchanging yield levels. On the other hand, a slight decline in the yield of jute which, together with the decline in area, resulted in more than 60 per cent reduction in output. This mainly due to the sluggish international market for jute goods because of the competing synthetic jute substitutes. Overall, this will help achieve comparative advantage in producing these cash crops. This will also promote processing industries and generate additional income and employment opportunities.

Potato, sugarcane, tobacco, jute and oilseeds are the major cash crops. Potato is mainly grown in mountain and high hills and partly in Terai region. Sugarcane, tobacco, and oilseeds are mainly grown in Terai and partly in hills. Jute is grown only 2-3 districts of eastern region. The area and production of cash crops has increased but yield has been more or less stagnant during last 6 years.

2.3.5 Other Crops

Crops included in this category are pulses, cotton, tea and cardamom. Pulses are widely grown in all climatic regions. Lentil, chickpea, pigeon pea, black gram, grass pea, horse gram, soybean are the major pulses grown in Nepal. Cotton is grown in western terai region and tea is grown in eastern region of Nepal.

2.3.6 Livestock

Livestock raising is an integral part of the agricultural production system in Nepal. This sub-sector not only provide manure and draft power to the crop sector but also form a major source of cash income to the farmers. Apart from these, livestock products especially ghee, hides and skins are important export items of Nepal.

Livestock sub-sector contributes 28.5 percent to the AGDP as of 1994/95. Total livestock population in Nepal is 32 million 559 thousand consisting 7 million 8 thousand cattle, 3 million 30 thousand buffaloes, 859 thousand sheep, 5 million 783 thousands goats, 670 thousand pigs, 14 million 521 thousand fowl, and 416 thousand ducks in 1995/96. The major livestock products being consumed or sold in the market are milk, meat, eggs, wool, and hide and skin.

Besides providing meat, milk, eggs and fish, livestock supplies raw materials for two of the important industries of the country viz. carpet industry and leather industry. The country has a sizable livestock population. Besides providing supplementary employment and incomes to small and marginal farmers, livestock products supply raw materials for various foods processing industries. The present level of production of meat, milk and milk products and fish are about 148,000 tons, 87,000 tons and 16,000 tons, respectively. The production of eggs is about 368 million. However, there is scope for a sizable increase in the production of all these items.

2.3.7 Horticulture

The main fruit varieties grown in the country are apple, orange, pineapple, litchi, banana, guava, walnut, lime and lemon. Productivity per hectare of fruits is eight to ten tons as against one to two tons for cereals. The present level of fruit production in the country is 500,000 tons only. Horticulture, especially fruit production, has considerable scope in the Hills and the Mountains of the country. The varying fruit based cropping systems such as monoculture of fruit species, inter-cropping of fruit trees with vegetables and with foodgrains are all ideal for the slopping contours of the Hills and Mountains. They will lead to (i) conservation of soil, (ii) utilization of marginal lands, (iii) maintenance of ecological balance, (iv) improvements in the nutritional standard of the people and (v) higher incomes per unit of land.

2.3.8 Forestry

Forest was considered the wealth of Nepal up to late seventies or early eighties. Since then, the forest area of Nepal is rapidly decreasing. Forest Development Master Plan, 1988 estimates the area covered by forest is about 37 percent of Nepal's total area, less then 20 percent from a decade earlier.

In Nepal, dependency on forest for essential commodities such as fodder collection, fuelwood, timber and land clearing for cultivation is very high with limited substitutes. Several industries in the country are based on forest products for their raw materials. The usefulness of the forest to maintain natural and ecological balance cannot be measured in the economic term.

2.4 Industry

Industry broadly defined (including mining, manufacturing, construction, electricity, water and gas) accounts for 22 per cent of the GDP. Within industry, construction accounts for more than 50 per cent of the value added. Manufacturing, including modern as well as cottage sectors accounted for 10 per cent of the GDP.

2.4.1 Manufacturing

According to the 1991/92 Census of Manufacturing Establishments, there were 4,230 establishments in operation, engaging 212,000 persons[i]. Of the five development regions, the Central Region accounted for the lion's share of the number of establishments, number of persons employed, value of output and value added. Even within the Central Region, establishments are concentrated in just three district of the Katmandu Valley. There are 13 districts in the country, all in the Mountains and the high Hills, which have not even a single manufacturing establishment.

There has been a steady decline in the share of cottage industries in the manufacturing GDP and total GDP. The fragile nature of industrial base of the Nepalese economy is evident from the production structure of manufacturing industries. The weighting diagram of the index of manufacturing industries, with 1986/87 as base, indicates that tobacco manufacturing alone accounts for 20 per cent of weight in the index. Cigarette, which has hardly any export market, accounts for about 19 per cent of the weight. Another 19 per cent of the weight is accounted for by food manufacturing. sugar and vegetable ghee are the principal products in this category. Textile have the third important position with a weight of over 18 per cent. Synthetic clothes dominate this group, followed by cotton clothes and jute goods. The group comprising of cement and bricks accounts for about 17 per cent of the weight. Detergents and matches are the main chemical products, which account for six per cent of the weight in the index. Other important industries like leather and products, wood and products, paper and products rubber and products, plastics goods and machinery have negligible weightage in the index of manufacturing.

The manufacturing sector remains relatively small and is at an early stage of development mainly dominated by cottage and small industries. During the 1970's the share of manufacturing sector in GDP staggered slightly above 4 percent and could not grow due to the preponderance of factors inimical to manufacturing development. The lack of adequate power supply and other essential infrastructure facilities seriously affected the utilization of existing capacity and withheld new investments. More, importantly, HMG did not have a consistent and clear-cut industrial policy to promote industrialization and private investment. The industrial policy was regulatory (i.e. licensing of manufacturing and trading establishments) and had cumbersome procedure that discouraged potential entrepreneurs. Consequently, private sector remained reluctant to undertake major investments, and the public sector continued to expand into the production of manufactured goods.

During the 1980's, however, industrial investment and production gained momentum. Industrial output grew more rapidly than GDP and the share of manufacturing sector in GDP increased from 4.3 percent to 5.5 percent between the inter-census years of 1981/82 and 1986/87. Manufacturing became one of the fastest growing sectors of the economy, and its production index more than doubled between 181/82 and 1987/88; thereafter, however, the momentum slacked due to extraneous factors. Even more significant are the accompanying qualitative and structural changes. A diversification of industrial production took place through the manufacture of many new products including electrical wires and cables, dry cells, plastic products, iron rods, and vegetable ghee; and soaring growth of readymade garments and hand-knotted carpets; the latter dramatically changed the structure of exports from mainly agricultural goods to overwhelmingly manufactured goods.

During the 1980s. HMG took many initiatives to accelerate the pace of industrialization. For instance it passed the Industrial Enterprises Act in 1982 and modified it in 1987 to reflect a major move from its regulatory approach to a developmental approach, considerably liberalizing and simplifying the industrial licensing system. This was accompanied by liberalization of import procedures for industrial raw materials, among others through the introduction of passbook system. Imports of many inputs required for industrial production were placed on open general license (OGL). A substantial relaxation of export control was also carried out. Notwithstanding these modifications, the overall environment for private investment remained less than satisfactory.

HMG took various bold measures in the trade and industrial front in the 1990s.

The trade policies hitherto pursued by Nepal simultaneously aimed at inward and outward looking goals. Measures like duty drawback could not be implemented because of a lack of mechanism. Anti-export bias continued due to absence of realistic exchange rate and existence of highly protected domestic industries. In 1992, new trade policy was designed to provide more roles to the private sector and to accelerate trade-led growth of the national economy. In an effort to correct the exchange rate distortion, Nepal adopted partial convertibility in 1992. Therefore, two exchange rates existed: market rate and official rate. In the first stage, 65 percent convertibility was introduced which was later raised to 75 percent. In 1993, full convertibility on current account was introduced. Within less than one and half year, Nepalese currency was made fully convertible on current account. However, it will take some time to introduce convertibility on capital account. Furthermore, bold steps in privatization was followed and interest rate was deregulated.

2.4.2 Growth and Structural Change of the Manufacturing Sector

Manufacturing sector has undergone major structural changes since the mid-1980s both in terms of value added and employment. For instance, during 1976/77 food, beverage and tobacco industries (FBT sub-sector) contributed 62 percent of the manufacturing value added which fell to 50 percent in 1986/87 and further fell to 25 percent in 1991/92. On the other hand, the respective share of textiles and leather sub-sector (TL sub-sector) went up from 5 percent in 1976/77 to 20 percent in 1986/87 and further increased to 48 percent in 1991/92. Similarly, the share of chemical sub-sector in manufacturing value added increased from 4 percent in 1976/77 to 19 percent in 1986/87 and increased slightly to 20 percent in 1991/92. The contribution of Mechanical subsectors and Electrical and electronoics subsectors are around six percent and one percent respectively.

The contribution of FBT sub-sector to total manufacturing employment has declined from 51 percent in 1976/77 to 29 percent in 1986/87. On the other hand, the share of TL sub-sector increased from 8 percent in 196/77 to 23 percent in 1986/87 while that of chemical sub-sector increased from 15 percent to 36 percent for the same period.

Table 2.7 provides the economic ratios in the manufacturing sectors and its intensity by employment size class.

Table 2.7: Selected Economic Ratios of Firms by Size Class of Employment

NUMBER OF WORKERS	SURVEY YEAR	N	Y/L1	Y/L2	K/L1	K/L2	(Y-WL)/K
<10	1991-92	46418	18.21	47.40	35.17	91.55	0.39
10-19	1996-97	1753	68.87	85.01	147.21	181.71	0.36
20-49	1996-97	834	91.50	99.37	112.01	121.64	0.65
50-99	1996-97	512	83.69	86.56	81.98	84.78	0.80
100-199	1996-97	284	127.59	129.89	150.93	153.65	0.72
2OO & ABOVE	1996-97	174	135.64	137.89	155.69	158.28	0.71

Source: CBS, Census of Manufacturing Establishments, 1996-97, Kathmandu, Nepal
CBS, Survey of Manufacturing Establishments, 1991-92, Kathmandu, Nepal.

Where, N= total establishments, Y= value added, L1= persons engaged including employers, L2= no. of employees, K= capital stock, (Y-WL)/K = profitability.

From the above figure, labor productivity is highest in Size class of 200 and above workers followed by 100-199 workers, 20-49 workers, 50-99 workers, 10-20 workers. The industries employing 20-49 workers were found having more labor productivity than the industries employing 50-99 workers. In the industries surveyed, K/L ratio is lowest in the size group of 50-99 workers. Except to this size group,other size group of firms are monotonically increasing from 10-20 size group to 200 and above.

Profitability is monotonically increasing from lowest size group to the 50-99 size group of firms and thereafter declining monotonically. Profitability is highest for the firms of the 50-99 size group.

2.5 Gas, Electricity and Water

Though Nepal is not well endowed with fossil fuels, it is very rich in biomass and hydelpower resources. the narrow gorges of the Himalayas provide some of the best sites to dam the great rivers for power generation and irrigation. So far, however, only a small fraction of the hydropower potential has been exploited. The installed capacity is only about 250 megawatt. Several major projects are at various stages of construction.

Nepal's vast potential to generate comparatively cheap hydroelectric power will enable the country to specialize in energy-intensive industries. With the generation of adequate electricity, the dependence on imported fuels like coal and petroleum products could also be reduced. At present, more than 90 per cent of the country's energy requirement are met from traditional sources like firewood, farm residues and livestock residues. In addition, only about ten per cent of the households in the country have access to electricity for domestic use. On a sectoral basis, the distribution of electricity consumption is as follows: household-use accounts for about 37 per cent followed by industrial use of 33 per cent, exports of 11 per cent and commercial use of six per cent. An assortment of miscellaneous usage account for the balance. Rural areas and agriculture have only a negligible share in the electricity use. Modernization of agriculture and development of agro-processing will require the availability of electricity at affordable rates in the rural areas.

The hydropower can be potentially a very profitable item for Nepal. Huge initial investments, however, will be required for developing hydo-electric projects, which Nepal will not be in a position to afford. Two possibilities can be explored. One is that His Majesty's Government with the financial and technical assistance of multilateral aid agencies like Asian Development Bank (ADB) and the World Bank can take-up these projects. Other is that the Government can allow private parties, national as well as international, to invest in the power projects for a fair royalty. Such royalty receipt may constitute as important source of resource for the Government to invest in other infrastructure sectors like road and communications. Only a small proportion of the potential power generation may be domestically consumed. However, within 1,000 km of the border of Nepal live more than 500 million people of South Asia. In addition, this is a region with large industrial town-ships and big cities, which are perennially starving for electricity. Therefore, an assured export market already exists. The waters of these projects will provide assured irrigation in the Tarai region of Nepal as well as the vast eastern gangetic plains of India and Bangladesh. Besides, the perennial flooding of these regions will become a thing of the past. It is, however, important to ensure that ecological and environmental safety are given due importance in all such projects. Further, it goes without saying that these projects can be meaningfully taken up only in the context of regional cooperation among South-Asian nations within the framework of SAARC.

2.6 Transport and Communication

A modern transport and communication system is essential for sustained development of a country. Nepal, because of its geography, has certain disadvantages in this respect. The road network of the country is still skeletal. The major national highway, which runs east to west, the construction of which was started three decades ago, has not yet fully completed (stiill 22 bridges are under construction). Motorable roads do still not connect many district headquarters in the Hills and the Mountains. Feeder roads and rural link-roads are totally absent in many areas. The repairs and maintenance of roads in hilly tracts is especially costly and difficult. Restoration of roads and bridges damaged by the devastating rains and floods in 1993 had resulted in the expense of sizeable capital resources and years of effort.

By the end of the Eighth Plan (1992-97), the country has 11,714 km length of roads of which 3,655 km are black-topped, 3,011 km are graveled, and 5,048 km are fair-weather roads. The Ninth Plan has given considerable importance to road building and maintenance. By the end of Ninth Plan, all the district headquarters except seven remote districts (Humla, Mugu, Manang, Dolpa, Solukhumbu, Khotang and Mustang) will be connected with motorable road.

The country has one railway covering a length of 51 km and one ropeway covering a length of 42 km. Both are inadequately utilized because of lack of repairs and maintenance. While the scope of railways may be limited, there is considerable scope for modern ropeways to facilitate transportation to the high Hills and the Mountains. This is because of the fact that the cost of construction and upkeep of roads in the Mountains and the high Hills is several times that in the plains. Moreover, construction of roads may aggravate landslides and soil erosion.

Because of limited road access to many regions in the country, civil aviation is forced to play an increasing role in providing passenger and cargo transport facilities in remote areas. Currently, air transportation is provided by the Royal Nepal Airlines Corporation (RNAC) along with three airlines and a helicopter company. Altogether, there are 43 airports in the country including an international airport at Kathmandu. Besides the domestic flights, RNAC operates international flights to the major cities of the neighboring countries as well as a few important cities in Europe. In addition, a number of foreign airlines regularly fly to Kathmandu.

With the liberalization of the economy and the important role expected to be played by private sector in the economy, the importance of a reliable and modern communication system has enhanced. In this connection, the Government has formulated a National Communication Policy in 1992. Postal service continues to be the main communication link between different parts of the country. All but one district has district post offices. Besides, there are about 500 area post offices and about 2,000 additional post offices in the country. Post offices provide money-order services at about 3,000 places and saving bank services at over 100 places.

Before the commencement of the Eighth Plan, 27 districts were not connected by telephone facilities. The end of the Eighth Plan connects all the district headquarters by telephone services.

2.7 Tourism

Tourism is an important source of foreign exchange for Nepal. About one-fifth of the foreign exchange earnings is from the sector. The scenic beauty and rich cultural heritage of the country are great attractions to foreign tourists. This is the land of Mount Everest and the birthplace of Lord Buddha. The number of tourists visiting the country has been steadily increasing over the years. The number reached 363,395 during 1995. About 90 per cent of the tourists arrive by air, and on the average, spend ten to 12 days in the country[ii]. Vast majority of the tourists visit the country for sightseeing. About ten to 15 per cent of them come for trekking and mountaineering. On the average, a tourist spends about 250 US dollars during his/her stay in the country. Out of this, about one-fourth each is spent on accommodation and food. The other major items of spending are component of tourist expenditure is worked out to about 43 per cent, including payments to intermediates and final inputs. Besides direct employment, tourism generates a sizable indirect employment also.

There is a considerable scope for further development of tourism in the country. The number of tourists visiting Nepal is still very small compared to those visiting countries like Singapore, Thailand and other small neighboring countries. To attract more tourists and to make them stay longer, there is an urgent need for development of tourism infrastructure. Adequate civil aviation facilities, both domestic and international, have to be created. In addition, better road transport and communication network will attract more tourists. There are about 22,000 hotel beds available during 1995, which include both star and non-star categories. However, most of them are concentrated in Kathmandu and Pokhara. Expansion of hotel facility, especially the non-star category, to tourist centers other than Kathmandu and Pokhara will further deepen tourism activities in the country.

Table 2.8: Gross Output, Intermediate Inputs and Value added in Agriculture

(In Millions of Rs. At Current prices)

Sub-sectors	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
Agriculture Proper									
Gross Output	17510	21431	25485	28894	33672	39844	43510	51177	54303
Intermediate Consumption	4346	5310	7554	7145	7845	9231	9661	11365	11964
Gross Value added	13164	16121	17932	21748	25826	30613	33847	39812	42339
IC/GO %	24.82	24.78	29.64	24.73	23.30	23.17	22.20	22.21	22.03
GVA/GO %	75.18	75.22	70.36	75.27	76.70	76.83	77.79	77.79	77.97
Food Grains									
Gross Output	11708	14267	15368	18685	21944	24456	25982	30806	31451
Intermediate Consumption	3216	3960	4142	4868	5507	6229	6574	7811	8039
Gross Value added	8492	10307	11226	13817	16436	18227	19408	22994	23412
IC/GO %	27.47	27.76	26.95	26.05	25.10	25.47	25.30	25.36	25.56
GVA/GO %	72.53	72.24	73.05	73.95	74.90	74.53	74.70	74.64	74.44
Cash Crops									
Gross Output	1934	2105	4142	3310	3708	4400	5154	5791	6006
Intermediate Consumption	569	616	2538	1278	1175	1426	1302	1464	1520
Gross Value added	1365	1489	1603	2031	2533	2974	3851	4327	4486
IC/GO %	29.42	29.26	61.27	38.61	31.69	32.41	25.26	25.28	25.31
GVA/GO %	70.58	70.74	38.70	61.36	68.31	67.59	74.72	74.72	74.69
Fruits and Vegetables									
Gross Output	2861	3832	4574	5245	5718	8549	9712	11100	12292
Intermediate Consumption	411	549	657	755	828	1210	1377	1588	1762
Gross Value added	2450	3283	3918	4490	4890	7339	8335	9513	10530
IC/GO %	14.37	14.33	14.36	14.39	14.48	14.15	14.18	14.31	14.33
GVA/GO %	85.63	85.67	85.66	85.61	85.52	85.85	85.82	85.70	85.67
Other Crops									
Gross Output	1007	1227	1401	1654	2302	2439	2662	3480	4554
Intermediate Consumption	150	185	217	244	335	366	408	502	643
Gross Value added	857	1042	1185	1410	1967	2073	2253	2978	3911
IC/GO %	14.90	15.08	15.49	14.75	14.55	15.01	15.33	14.43	14.12
GVA/GO %	85.10	84.92	84.58	85.25	85.45	84.99	84.64	85.57	85.88
Livestock									
Gross Output	8233	9355	10591	13158	14217	16892	18353	21127	22530
Intermediate Consumption	844	1002	1167	1918	1626	1760	2029	2558	2631
Gross Value added	7389	8353	9424	11240	12590	15132	16324	18569	19899
IC/GO %	10.25	10.71	11.02	14.58	11.44	10.42	11.06	12.11	11.68
GVA/GO %	89.75	89.29	88.98	85.42	88.56	89.58	88.94	87.89	88.32
Forestry									
Gross Output	2150	2526	3060	3493	3844	4348	4729	6194	6599
Intermediate Consumption	38	38	50	60	63	72	71	110	97
Gross Value added	2112	2489	3009	3433	3781	4276	4658	6085	6503
IC/GO %	1.77	1.50	1.63	1.72	1.64	1.66	1.50	1.78	1.47
GVA/GO %	98.23	98.54	98.33	98.28	98.36	98.34	98.50	98.24	98.55

(Contd..Table 2.8)

Fisheries									
Gross Output	98	178	264	344	384	460	552	707	751
Intermediate Consumption	0	4	7	9	10	11	14	18	19
Gross Value added	96	173	257	335	374	448	538	689	732
IC/GO %	0.00	2.25	2.65	2.62	2.60	2.39	2.54	2.55	2.53
GVA/GO %	97.96	97.19	97.35	97.38	97.40	97.39	97.46	97.45	97.47
Total									
Gross Output	27991	33490	39400	45889	52117	61544	67144	79205	84183
Intermediate Consumption	5228	6354	8778	9132	9544	11074	11775	14051	14711
Gross Value added	22761	27136	30622	36756	42571	50469	55367	65155	69473
IC/GO %	18.68	18.97	22.28	19.90	18.31	17.99	17.54	17.74	17.48
GVA/GO %	81.32	81.03	77.72	80.10	81.68	82.00	82.46	82.26	82.53

Table 2.9 : Gross Output, Intermediate Inputs and Value Added in Non-Agriculture

(In Million Rupees at Current Prices)

Sub-sectors	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
Mining and Quarrying									
Gross Output	215	252	282	346	462	496	632	868	1001
Intermediate Consumption	21	24	25	29	41	47	58	73	79
Gross Value added	193	228	257	317	421	449	575	795	921
IC/GO %	9.77	9.52	8.87	8.38	8.87	9.48	9.18	8.41	7.89
GVA/GO %	89.77	90.48	91.13	91.62	91.13	90.52	90.98	91.59	92.01
Modern Manufacturing									
Gross Output			8087	10693	12577	14545	20059	31851	36300
Intermediate Consumption			5507	7474	9225	10326	14121	21483	24334
Gross Value added			2580	3218	3353	4218	5937	10367	11966
IC/GO %			68.10	69.90	73.35	70.99	70.40	67.45	67.04
GVA/GO %			31.90	30.09	26.66	29.00	29.60	32.55	32.96
Small Manufacturing									
Gross Output			3734	4477	4763	5579	6269	7539	8136
Intermediate Consumption			2574	3080	3259	3841	4339	5084	5484
Gross Value added			1160	1397	1504	1738	1957	2455	2652
IC/GO %			68.93	68.80	68.42	68.85	69.21	67.44	67.40
GVA/GO %			31.07	31.20	31.58	31.15	31.22	32.56	32.60
Electricity and Water Supply									
Gross Output	264	409	491	601	749	825	1063	1599	1986
Intermediate Consumption	80	81	95	160	282	302	248	361	549
Gross Value added	184	327	396	441	466	523	815	1238	1437
IC/GO %	37.21	19.80	19.35	26.62	37.65	36.61	23.33	22.58	27.64
GVA/GO %	85.58	79.95	80.65	73.38	62.22	63.39	76.67	77.42	72.36
Construction									
Gross Output	6473	7825	8871	10862	14240	15417	19173	25749	30128
Intermediate Consumption	2712	3275	3709	4559	6009	6474	8094	10980	12810
Gross Value added	3761	4550	5162	6303	8231	8943	11078	14769	17318
IC/GO %	41.90	41.85	41.81	41.97	42.20	41.99	42.22	42.64	42.52
GVA/GO %	58.10	58.15	58.19	58.03	57.80	58.01	57.78	57.36	57.48
Trade									
Gross Output	5032	6084	7354	8859	10037	11445	14038	17963	20566
Intermediate Consumption	1047	1197	1466	1759	2161	2393	2893	3762	4330
Gross Value added	3984	4887	5888	7101	7876	9052	11145	14201	16236
IC/GO %	20.81	19.67	19.93	19.86	21.53	20.91	20.61	20.94	21.05

(Contd.. Table 2.9)

GVA/GO %	79.17	80.33	80.07	80.16	78.47	79.09	79.39	79.06	78.95
Hotel & Restaurant									
Gross Output	1445	1824	2193	2484	2829	3551	4205	5574	6804
Intermediate Consumption	868	1089	1261	1467	1653	2096	2449	3212	3789
Gross Value added	577	736	933	1017	1175	1455	1757	2363	3015
IC/GO %	60.07	59.70	57.50	59.06	58.43	59.03	58.24	57.62	55.69
GVA/GO %	39.93	40.35	42.54	40.94	41.53	40.97	41.78	42.39	44.31
Land Transport									
Gross Output	3351	3846	4419	5050	5554	6299	7418	9245	11406
Intermediate Consumption	1273	1496	1749	2078	2370	2606	3149	4021	4993
Gross Value added	2078	2350	2670	2971	3184	3693	4269	5224	6413
IC/GO %	37.99	38.90	39.58	41.15	42.67	41.37	42.45	43.49	43.78
GVA/GO %	62.01	61.10	60.42	58.83	57.33	58.63	57.55	56.51	56.22
Air Transport									
Gross Output	782	874	967	1157	1419	1757	1993	2747	4245
Intermediate Consumption	584	674	764	796	992	1133	1340	1775	2802
Gross Value added	198	199	204	360	427	623	653	972	1443
IC/GO %	74.68	77.12	79.01	68.80	69.91	64.48	67.24	64.62	66.01
GVA/GO %	25.32	22.77	21.10	31.11	30.09	35.46	32.76	35.38	33.99
Storage									
Gross Output	5	7	9	16	17	26	23	24	30
Intermediate Consumption	2	3	2	4	6	7	4	5	6
Gross Value added	3	5	7	12	11	19	19	19	24
IC/GO %	40.00	42.86	22.22	25.00	35.29	26.92	17.39	20.83	20.00
GVA/GO %	60.00	71.43	77.78	75.00	64.71	73.08	82.61	79.17	80.00
Communication									
Gross Output	219	297	416	533	763	994	1156	1646	2170
Intermediate Consumption	44	56	81	107	164	154	133	172	218
Gross Value added	174	242	335	427	599	840	1023	1474	1952
IC/GO %	20.09	18.86	19.47	20.08	21.49	15.49	11.51	10.45	10.05
GVA/GO %	79.45	81.48	80.53	80.11	78.51	84.51	88.49	89.55	89.95
Services Incidental to Transport									
Gross Output	427	552	725	903	964	1033	1123	1637	1859
Intermediate Consumption	200	259	340	424	452	485	527	768	872
Gross Value added	227	293	385	479	511	548	596	869	986
IC/GO %	46.84	46.92	46.90	46.95	46.89	46.95	46.93	46.92	46.91
GVA/GO %	53.16	53.08	53.10	53.05	53.01	53.05	53.07	53.08	53.04
Finance and Insurance									
Gross Output	848	970	1186	1495	2069	2528	3395	4339	5410
Intermediate Consumption	162	198	219	283	399	497	546	708	833
Gross Value added	686	772	967	1212	1670	2031	2849	3631	4577
IC/GO %	19.10	20.41	18.47	18.93	19.28	19.66	16.08	16.32	15.40
GVA/GO %	80.90	79.59	81.53	81.07	80.72	80.34	83.92	83.68	84.60
Real Estate									
Gross Output	3257	3896	4624	5346	6217	7060	7811	9167	10499
Intermediate Consumption	90	110	134	152	174	211	239	287	319
Gross Value added	3167	3786	4491	5194	6043	6848	7573	8880	10180
IC/GO %	2.76	2.82	2.90	2.84	2.80	2.99	3.06	3.13	3.04
GVA/GO %	97.24	97.18	97.12	97.16	97.20	97.00	96.95	96.87	96.96
Business Services									
Gross Output	174	220	276	357	415	506	677	942	1194
Intermediate Consumption	40	50	65	82	96	116	154	212	267

(Contd.. Table 2.9)

Gross Value added	134	170	211	274	319	389	523	730	927
IC/GO %	22.99	22.73	23.55	22.97	23.13	22.92	22.75	22.51	22.36
GVA/GO %	77.01	77.27	76.45	76.75	76.87	76.88	77.25	77.49	77.64
Government Services									
Gross Output	4371	5065	5797	6895	8947	8959	11085	11908	14900
Intermediate Consumption	1388	1795	2159	2652	3252	3260	3768	3638	4492
Gross Value added	2983	3271	3638	4243	5695	5699	7317	8270	10408
IC/GO %	31.75	35.44	37.24	38.46	36.35	36.39	33.99	30.55	30.15
GVA/GO %	68.25	64.58	62.76	61.54	63.65	63.61	66.01	69.45	69.85
Other Services									
Gross Output	1077	1335	1638	1941	2397	2956	3733	4981	6920
Intermediate Consumption	257	324	403	493	623	794	1059	1463	2213
Gross Value added	820	1011	1235	1448	1774	2161	2674	3518	4707
IC/GO %	23.86	24.27	24.60	25.40	25.99	26.86	28.37	29.37	31.98
GVA/GO %	76.14	75.73	75.40	74.60	74.01	73.11	71.63	70.63	68.02

CHAPTER III

OVERVIEW OF THE TRADE REGIME AND EXTERNAL SHOCKS

3.1 Introduction

Nepal was in isolation to outside world until recently. It was only in 1950 that Nepal began to open up with the outside world after the overthrow of Rana regime. During the past half century, Nepal has been able to diversify its foreign policy, making diplomatic ties with the major countries of the world. The economy has been changed from a prolonged isolation to an active participant in the economic affairs. However, the changes that have been ushered in the country are not that to be proud off, but at the same time are not disappointing either. Being a land locked country, it was not easy for her to expand trade. On the one hand, she has to face the constraints for increasing and diversification of trade, on the other, she has to face considerable difficulties not having conducive transit facilities. Time and again, Nepal has to face transit difficulties as well. Nepal's considerable time and efforts have been invested in expanding transit routes and making separate arrangements of trade and transit treaty with India. Although, Vienna Convention has safeguarded the right to access sea for landlocked countries, in practice, landlockedness seriously constrains the opportunities for expanding trade.

3.2 Nepal's Trade Regime

Nepal has preferential relations with India since 1950 with exceptions of few turbulent periods of Nepal -India relations.[1] The trade relations with the third world countries have been conducted on the basis of Most Favoured Nation clause. Nepal's trade with Tibet is conducted on the basis of barter trade. Nepal's trade with socialist countries are conducted partly in US dollar and partly on barter and buy back conditions. Nepal's considerable time and effort has been expended to diversify her trade with third world countries, and in this endeavor she has also got success in the export fronts. In the import front, still India enjoys the dominant share.

3.3 Overview of the Trade Regime with India

During the 1950s, the dominant economic thinking was that of import substitution led industrialization in the developing countries. The major assumption under this strategy was that the developing countries being the exporter of primary commodities has to face the adverse terms of trade effect as the price of agricultural commodities that these countries used to export either stagnated or declined in comparison to manufactured exports of the developed country. This export pessimism of developing countries was reflected in the infant industry arguments for protection of domestic industrialization and broadly, towards import substitution led industrialization policies. In addition to this, aftermath of the Second World War, a surge of national movements culminated and many of the former colonies get independence from colonial yoke of centuries. These countries had variety of colonial experience and have different degree of inherited economic and political situations. In many of the cases, they have to start from scratch. Therefore, they had enormous responsibility to put the economy and polity in a situation of high expectation of the masses. Therefore, it was

[1] During the Nepal-India impasse 1988-1990, Nepal followed MFN relation with India.

natural that they need sometime to develop the necessary infrastructure, skills, expertise and know-how in order to participate in competitive trade. Prebish and Singer in the Latin America and Mahalnobis in India provided the intellectual impetus for such policies. At that time, Prebish being the secretary-general of UNCTAD had influenced very much the intellectual currents of the day in the Latin American Countries and most of the developing countries as well. In India, Mahalnobis's four-sector model provided the intellectual basis for import substitution industrialization, and India followed the strategy on the hypothesis that being a large country it has economies of scale to embark upon. The usual infant industry arguments and dynamic comparative advantage also were other consideration for such strategy.

Nepal's development history is very short. She opened up to the modern world with the overthrow of Rana regime in 1950, and had to start virtually from the scratch in the drive towards modernization, let alone its policies in the external sector. Nepal signed a Treaty of Peace and Friendship with India in 1950. The Treaty provided the **National Status** to the citizens of both countries and unfettered access to join any trade, profession and occupation. This paved the way for the Nepal-India bilateral relations, and a regime of preferential trade and investment relations between the two countries.

In 1960, first revision of the Treaty of Trade was made. The 1960 Treaty of Trade aimed at the establishment of a common market between Nepal and India. Accordingly, it provided a duty free access to their respective markets. Both countries agreed to levy the same tariff rates on goods imported from third countries. An excise duty refund procedure was initiated whereby India refunded excise duty on goods imported under AR-1 form. Nepal was not allowed to levy the duties applicable to goods, as this would make Indian goods uncompetitive. This practice equalized prices in India and Nepal and addressed the Indian concern that exports being cheaper than domestic sales, Nepalese trades might circumvent the Indian trade law by reexporting the Indian goods to the Indian market. Article 11 of the treaty had allowed Nepal to impose both protective and revenue tariffs. If Nepal persuades policies divergent from India, it was decided to hold consultations between the two countries so as not to hinder the flow of goods.[2]

Notwithstanding the commitment to move to the common market, Nepal introduced an Exchange Entitlement Schemes (EES) in 1961 under which exporters were entitled to receive a certain percentage of their export earning for imports of luxury goods, which had immediate markets in Nepal and India. An importer could earn multiples on little investment. Exports were made well below cost prices, but imports were highly profitable to compensate the losses.

During the 1960s, factories based on third country raw materials were established in Nepal with an eye to the Indian market. India put up restrictions on the goods using third country raw materials viz. stainless steel and rayon fabrics. India held that Nepalese goods entering the Indian market must contains 100 percent raw materials originating there. Nepal maintained that the treaty did not specify the percentage of Nepalese raw materials. Both countries moved away from the goal of common market as visualized in the 1960 Treaty of Trade. Nepal introduced protective duties on cigarettes, shoes etc. Notwithstanding India's pledge to provide duty free access for Nepalese Products, she introduced restriction on matches and strawboard. The restriction was in response to the pressure of Indian

[2]Banskota, N.P. (1995), South Asian Trade Cooperation : Global Perspectives, Ratna Pustak Bhandar - Kathmandu, pp.

businessman to protect their industries. Industrial lobby in India strongly influenced the government policy.

In 1971, Nepal signed a Treaty of Trade with India after several months of intense negotiations in Kathmandu and Delhi. Unlike its predecessors, the treaty was important in one respect: it did not include common market or customs union arrangement. The 1960 Treaty of Trade did not meet the needs of Nepal for foreign raw materials and technologies as India itself imported these on a large scale. A new form of arrangement as envisaged in 1971 Treaty of Trade laid a restriction on Nepalese exports to India. Under Article, IV India agreed to provide preferential treatment to Nepalese goods containing not less than 90 percent of Nepalese and Indian materials. Though primary goods were provided preferential treatment on a reciprocal basis (Article III), Nepalese trades had to obtain permits to move these goods from one Indian State to another under the Movement Control Orders.[3]

In 1978, for the first time two separate treaties were signed, one was relating to trade and other relating to transit. Although the 1978 trade treaty was fundamentally not different from the preceding one, it granted concessions to manufactured articles containing not less than 80 percent of Nepalese materials or Nepalese and Indian materials. The provision of at least 50 percent value added as a condition for eligibility for export to India was also retained.

With the expiry of both the trade and transit treaties on March 23, 1989 (after several extensions), an impasse followed with both countries resorting to the tariff structure under the Most Favoured Nation (MFN) system. Nepal's export to India came to a stand still as costumes duties imposed by India reached 145 percent for most primary products which had no duty before the impasse. In case of manufactured imports, duties imposed by India ranged from 0-245 percent from the pre-impasse level of 0.20 percent. The impasse created severe problems in Nepal's overall trade situation with serious shortfall of petroleum, oil and lubricant (POL) products and industrial inputs and materials. To meet the shortfall in supply of essential commodities, open general license (OGL) system was expanded in its coverage of items.

In April 1990, following the political change in Nepal, an agreement was reached with India to restore status quo ante pending the finalization of a comprehensive arrangement covering all aspects of bilateral relations. The government of India agreed to exempt from basic costumes duties and quantity restrictions for all manufactured articles containing not less than 65 percent of Nepalese and Indian materials; allow 50 percent tariff concessions on MFN rate of import duty where value of Nepalese or Indian materials and labour added in Nepal is at least 40 percent of the ex-factory price; refund Indian excise duty to Nepal under the duty refund procedure to cover but not to exceed the basic and additional costumes duties levied on similar goods imported from third countries. Nepal on its part agreed to restore tariff preferences to Indian goods by intermediate exemption of additional costumes duty; expand basic costumes duty on import of primary products from India as provided for similar products from Nepal imported to India; curb tariff preferences to third country goods so that it would not be detrimental to the tariff for Indian exports; value Indian goods exported under DRP for assessment of basic costume duties on the basis of ex-factory/ex-depot price, excluding any element of refundable Indian duties and taxes, but including transport and insurance charges, wherever applicable.

[3] Banskota, N.P. (1995), South Asian Trade Cooperation : Global Perspectives, Ratna Pustak Bhandar - Kathmandu, pp.

Nepal's trade and foreign exchange regime is already quite liberal. Nevertheless further improvements in trade and investment policies can help stimulate exports, private sector activity and economic growth. A recent World Bank Country report on Nepal makes the following observation in the trade and investment policies of Nepal:

"Nepal has applied for membership in WTO , is already a member of SAPTA (which is committed to moving to a regional free trade arrangement), and stands to directly benefit from economic liberalization in India. To take advantage of these opportunities. Nepal needs to progressively reduce its tariffs at least in line with those in India. Nepal also needs to improve its competitiveness through technological upgrading , skill development and export promotion measures; and diversify its export products and markets. Developing new high value agricultural crops/products (through effective implementation of the Agricultural Perspectivre Plan) and promotion of tourism for the Indian market and joint ventures for supplying light manufactures to neighbouring Indian states (a good start has been made already in the last two years), provide possibilities in this regard. Nepal also needs to take full advantage of bilateral trade and transit agreements which were concluded recently with India. The recent trade agreement has waived the prevailing 50 percent value added requirement on Nepalese exports to obtain duty free access to the Indian market; while the new transit agreement provides for anew land route to Bangladesh ports through Indian territory and the establishment of dry port at Birgunj which will considerably reduce transport delays and costs for Nepal. Nepal now needs to work out appropriate administrative arrangements with India to implement the trade arrangement and undertake the necessary investment for transport improvements."[4]

3.4 Major Policy Initiatives to Promote Trade

3.4.1 Exporter's Exchange Entitlement Scheme

Exporter's Exchange Entitlement Scheme (EEES) and the Dual Exchange Rate System (DER) were the significant measures introduced to diversify Nepalese exports. The EEES also known as the Bonus Scheme introduced in 1961 and operative until 1978 was the first principal measure directed towards promoting and diversifying Nepalese exports to overseas markets. The EEES was replaced by the DER effective March 30, 1978. The DER was abolished on September 18, 1981.

Under the EEES, exporters were entitled to varying percentage of export earning that they must use to import a wide range of otherwise restricted semi-luxury and luxury goods from the third countries. The idea was to allow exporters to make up the possible losses that they may suffer in diverting exports from India to overseas countries.

The mechanism of the scheme worked in the following way. The exporters were required to surrender their export receipts earned by exporting to overseas countries to the Nepal Rastra Bank, the Central Bank, at the official rate. Upon surrendering such proceeds, exporters were, in return given an exchange entitlement corresponding to a specified ratio of these proceeds. This ratio varied from export commodity to commodity. In addition, import licenses for goods specified for imports under the scheme were to be automatically issued in the name of the holder of the exchange entitlement. The incentive mechanism can be seen to function in

[4] World Bank (1997), Nepal 1997 Economic Update: The Challenge for Accelerating Economic Growth, Report No. 17034-NEP, South Asia Region, World Bank.

two ways. In the first place, the entitlement holders had access to the otherwise inaccessible convertible currency as entitled under the scheme at the official exchange rate, which was substantially lower than the free market rate. Secondly, the automatic guarantying of import licenses to the entitlement holders enabled them to import various goods from the overseas countries whereas the non-holders had no such privileges. This had the effects of imparting oligopolistic power to the few entitlement holders enabling them to sell the imported goods at a marked up price that represented a premium. Before 1964, only one entitlement ratio existed, ranging between 60 to 85 percent of exporter's exchange earnings. In 1964, major modifications were introduced. In the modifications, the entitlement ratios were related to commodities exported in place of the foreign exchange proceeds as done in the past. Further modification was in the classification of traders and industrialist, and different ratio was attached to each group with a view to give more incentives to industrialist. An additional classification was included, proving special ratios for industries incurring heavy foreign exchange costs. Since the logic behind the entitlement ratio was to compensate the losses that exporters may suffer in their exports to overseas countries instead of India and since the losses varied from commodity to commodity there had to be an increasing number of ratios. Indeed, the number of entitlement ratios thus theoretically could be as numerous as export commodities themselves. Thus, the scheme as it existed before 1964 was highly cumbersome and incorporated number of anomalies. In 1971, the distinction between traders and industrialist was eliminated. The special ratio applicable to firms incurring heavy expenditure of foreign exchange was also abandoned, reducing to some extent the incentives for import oriented and capital intensive form of production. In April 1975, the number of entitlement ratios was reduced from nine (ranging from 20 percent for raw jute to 90 percent for stainless steel products) to three (60 percent, 75 percent and 90 percent). There was no change in the eligible imports or exports, with the exception that exports of raw jute formally ceased to be eligible for exchange entitlement under the scheme. In December 1975, the number and rates were further reduced with a view to simplify the growing complexity of the scheme. The entitlement rates were fixed at 45 percent and 60 percent, and these two ratios continued to prevail until the scheme was scrapped in 1978. At the same time exports of raw jute was again made eligible under the scheme with an entitlement of 45 percent.[5]

3.4.2 Permissible Imports under the Scheme

Although large variety of goods could be imported under the scheme, some restrictions were applied to the use of entitlements with a view to ensure that some proportion is used for the import of development oriented goods. In the original scheme and the 1964 modifications, only minimal restrictions were imposed on the type of imports. In 1969, a provision was introduced requiring exports whose entitlements exceeded Rs. 10,000 per annum, to use 15 percent of their entitlements to import specified development goods. In 1970, the imports of all industries were restricted to raw materials, spare parts and machinery all for use in their own production. This was, however, relaxed a year later in 1971. In 1973, new and more comprehensive restrictions were introduced regarding the use of exchange entitlements. Under the new provisions, exporters who receive more than Rs. 25,000 in entitlements in any year, were required to spend at least 25 percent of their entitlement to import development goods, capital equipment for use in agriculture and industry, transport equipment, spare parts and new materials. Another 20 percent could be used for importing specified consumer goods, like dried fruits, spices, radios, tape recorders, refrigerators, pharmaceuticals, alcoholic beverages, and photographic equipment. In addition, 10 percent of the entitlement

[5] See Poudyal, S.R. (1988), Foreign Trade, Aid and Development in Nepal, Commonwealth Publishers, New Delhi, pp.107-125.

may be spent on the import of office equipment, stationary, electrical goods, automobiles, sewing machine, imitation jewelry, and many other consumer goods. The remaining 45 percent may be used to import different types of clothes, sugar, milk and other food products. No restrictions were however, imposed on entitlements of less than Rs. 25,000 annually.

3.4.3 Transferability of Entitlement

Although the exporters' exchange entitlements had earlier been not legally transferable, considerable indirect transferability existed through the advance sale of goods imported under the scheme. In 1973, the entitlements were made legally transferable to importers through sale in the open market at a premium thus giving rise to a dejure system of multiple exchange rates.

3.4.4 Accomplishment of the Scheme

The data during the period of scheme implementation shows that the scheme contributed very much for diversification of exports to the overseas countries. Exports to overseas countries rose from 2.6 percent of total exports to a peak of 30.4 percent of total exports in 1969-70, and 52.0 percent of total exports by 1977/78, the last year of the scheme implementation. While the scheme diverted exports away from India, imports, however, remained concentrated in India. It was only since 1975/76 imports from overseas countries started to increase appreciably. The effect of increased exports to overseas countries was reflected on the convertible foreign exchange revenue which continued to grow steadily (except in 1974-75) from Rs. 76.4 million in 1961 to Rs. 1603 million in 1977.

The scheme was not successful in trade creation and expansion. Many primary commodities that could be exported more profitably to India also were diverted to overseas countries under the lure of foreign exchange entitlements. Though there was some increase in the non-traditional exports to third countries, the overwhelming proportion of total increase was mainly at the cost of traditional items to India.

The diversion of exports away from India to the overseas countries resulted in a serious shortage of Indian Rupees to pay for imports from India. With exports previously going to India being diverted away to other countries and imports remaining concentrated on India, there was a growing pressure on Indian Rupees reserve to meet the ever-growing trade deficit with India, and Nepal had to sell convertible currencies to buy Indian Rupees. During 1975-76 to 79-80, Nepal had sold a total of Rs 2318.4 million worth of convertible currencies to buy Indian Rupees.

This represents a rather anomalous situation because this is in effect tantamount to exporting commodities to India but at a higher cost to Nepal. The higher cost is mainly due to the fact that dollar sales against Indian rupees were at a lower rate than what the Nepal government had to pay to get dollars from exporters. Until the downward revision of the `second rate' in February 1980, the country had to purchase US dollars from the exporters at a rate of Rs. 15.90 per dollar, but the exchange rate between dollar and the Indian rupees was such that Nepal could obtain Indian Rupees worth Nepalese Rupees 11.90 per dolor exchanged with India. There was thus a net loss of Nepalese Rs. 4 per dollar sold to India. Even after the downward revision of `second rate' to 13.90 per dollar, the loss was Rs. 2 per US dollar exchange with India currencies. Besides this, the EEES also brought other distortions in the economy. The most important distortions were over invoicing of exports and influx of non-essential and luxury goods. The scheme gave rise to an incentive to over invoice exports with faked, higher price declaration. Indeed, the over invoicing in carpets in 1979 was so scandalous that it overshook the influential offices like the Ministry of Finance and the Nepal Rastra Bank, and the cabinet. At a time when Nepal's need was a long-term export drive based increasingly on the export of non-primary commodities, the practitioners of over invoicing stifled the efforts of genuine entrepreneurs who could be relied upon for the development of sustained development of export products.

The scheme encouraged more of non-essential and luxury imports than the imports of development oriented goods. Under the lure of high premiums, even the 25 percent condition laid for development goods was flouted through malpractice, **and** all imports tended to be non-essential and luxury items. Moreover, as there was no restrictions on entitlements of less than Rs. 25,000 in any year, exporters had the opportunity to send their export consignments in the name of sons and relatives or make other arrangements for having the full amount of entailments to be used in the import of luxury and semi-luxury goods. Because of these, the entitlement holders were able to acquire the maximum possible imports of fancy good under the scheme, while the country needed more of the imports of capital goods. Thus, the inherent built in mechanism in the scheme offering wide scope for the import of non-essential goods seemed to be inconsistent with the country's development objectives.

3.5 The Dual Exchange Rate System (1978-1981)

Under the dual exchange rate system two exchange rates for buying and selling of foreign currencies, one at the official rate and the other at the depreciated rate were fixed. The basic (official rate of exchange was fixed at US$ 1=Rs. 12 and applied only to the import of certain development goods and essential commodities, while the depreciated second rate was fixed at US$ 1=Rs. 16 and applied for the imports of goods excepting those qualifying to the basic rate and for all overseas exports. Upon surrounding their foreign exchange earnings obtained through overseas exports, exporters were to be paid Nepalese Rupees at the depreciated rate of US$ 1=Rs.16. This was the incentive mechanism under the DER system for encouraging exports to the third countries.

A fundamental improvement in the DER system over the EEES was the delinking of imports from exports. Unlike the EEES, exporters were no longer automatically entitled to foreign exchange for importing luxury and non-essential goods. Any importer could obtain foreign currencies at the basic rate for the imports of specified development goods and construction materials, and the second rate for the imports of luxurious commodities that were not subject to quantitative restrictions. Some 17 commodities of luxurious nature were put into quantitative restriction, while the rest could be imported at the depreciated rate of foreign exchange upon obtaining import license. Thus, under the DER system, unnecessary and avoidable imports were discouraged.

Despite the several advantages of the DER over EEES, it could not also put an end to the practice of over invoicing exports. Moreover, the emergence of defacto crossed rate created a conducive atmosphere for speculation in one currency against another, putting tremendous pressure on the already shaky Indian currency reserves of the country. Realizing the continued practice of over invoicing by unscrupulous traders and also that the incentives in terms of depreciated exchange rate was not producing the desired effects on exports, the government readjusted, in February 1980, the second rate to US$ 1=Rs 14. However, the results did not appear to be fruitful and achievements in promoting exports were quite poor.

Finally in September 1981, the DER system was wound up and a uniform buying and selling rate of Rs 13.10 and Rs 13.30 per US dollar was fixed irrespective of the nature of commodities involved in trade transactions.

To promote manufactured exports a number of special facilities have been provided to exporters to allow them access to imported inputs at world market prices. These include both duty drawback and bonded warehouse facilities. Such facilities are vital for promoting exports so long as the trade regime is not fully liberalized.

3.6 Bonded Warehouse Facilities

The bonded-warehouse system has been introduced in Nepal in 1988 especially for the garment exports industry. Under this facility garment manufacturer/exporters are allowed to import exempt from duties and sales taxes cloth from India and auxiliary inputs from third countries By 1992, 239 licenses had been issued for bonded warehouses. These warehouses are maintained at the premises of the garment manufacture.

When a garment manufacturers wishes to apply for a bonded warehouse license with the Customs department he has to submit certification of the firm's registration at the Department of Industry. The approval procedure involves inspection of the garment factory by officials from the customs department. After a positive inspection report, license is issued for the period of one year, which, upon application, is automatically extended.

For the utilization of the bonded-warehouse facility, goods imported under bond have to be financed through L/Cs. Moreover, importers are required to establish a guarantee fund at a bank covering the duties and sales tax on the imported items. The guarantee fund is released at the time of payment for the exported garments in which the inputs has been used. "In several countries back-to-back L/Cs are used in the administering of the bonded-warehouse system, as such L/Cs relate most directly to export orders to import of inputs The back-to-back L/C is an L/C which can be opened by an exporter to import inputs on the basis of an L/C opened by a foreign buyer for his products. In this case, the latter L/C acts collateral for the back-to-back L/C. In Nepal, the back-to-back facility is not yet operating effectively. Moreover, L/Cs (the master L/C) are in foreign currency, whereas most of the imported inputs (cloth) is imported from India. There is still no mechanism to allow the use of master L/C to open a back-to-back L/C in Indian currency.

A main component of an effective bonded-warehouse facility is efficient control of the use of the materials imported under bond in the exported garments. The verification system applied by the customs department involves the following procedure. At the time of importation of the inputs, details are recorded in a passbook and swatches are kept of the materials imported. Photocopies of the passbook are kept of different custom points, so that no problem will arise in case import and export shipments have to be checked simultaneously at different custom locations. At the time of export, an estimate is made of the materials used in these garments based on standard input-output coefficients. The Ministry of Commerce prepares these input-output coefficients on advice from the Garment Export Promotion Committee. At the time of export, also the swatches of material taken at the time of import are compared with the material used in the garments.

Controls over the stocks imported under bond at the factory have been substantially relaxed in recent years. It is no longer necessary to keep these, stocks in separate warehouses. In fact, at arrival, these inputs directly enter the production process at the factory. While the Custom's Department Policy is to undertake regular spot checks on the bonded inventories, this is rarely done. The exporters also express the Customs Department's increasing leniency with respect to inventory control in relaxing record keeping requirements of such stocks. Another expansion of the relaxation of the bonded warehouse inventory control is the abolishment of the requirement to submit once a year all waste material to the Custom Departments for checking wastage rates and for subsequent destruction. Because of the abolishment of this, practice problems which exporters used to face related to determining appropriate wastage rates appear to have been resolved.

In general, it can be concluded, that the bonded warehouse system works satisfactorily. In recent years, its functioning has been facilitated by relaxation of inventory controls by the Customs Department. Nevertheless, there remains a numb of nagging problems in using bonded-warehouse facilities, which unnecessarily add to the cost of exporting. These include:

i The verification of materials using swatches sometimes causes problems, e.g. in case discoloring of the materials have occurred. Through, reportedly shipments are not held up for this reason, the guarantee fund put up by the exporters in lieu of payment of import duties and sales taxes is not released until the differences are resolved. This verification procedure needs to be simplified e.g. by recording only the type and quality of material, possibly supported by laboratory tests;

ii. The guarantee fund put up by the exporter for the duty and sales tax due on the imported materials is only released by customs after payment from the importer has been received. This is done because in some cases the foreign importers did not accept export shipments. On returns of such shipment import duties on import materials would be due. However, as these are exception cases, this procedure unnecessary ties up working capital funds. It is recommended, therefore, that guarantee funds should be released after the export has taken place.

3.7 Duty Drawback Facility

The duty drawback facility was introduced in Nepal in 1987. The Customs Department administers the duty drawback system, for both import duties and sales taxes. Within the customs department, a separate section, different from the section handling with the bonded warehouse facility and reporting to a different Deputy Director General deals with it. The operational procedures are simple. An exporter can apply for duty and sales tax drawback to the Customs Department by submitting evidence on both the export transaction and on the imports in inputs used in the export product. These submissions have to be certified by the Department of Industry. This procedure immediately points to one of the limitations of the facility. It can only be used by exporters/manufacturer/importers. Duties on inputs imported by traders or by input-supplying industries are not covered by the scheme. In practice other limitations as well, including long procedures. But the main obstacle is that the Custom's Department budget for refunding drawbacks is limited. In practice, this has meant that only part of the applications could be honored. For example, during 91/92, 24 applications were submitted for duty drawbacks for NRs 3.3 million of which only 50 percent could be honoured. In general, therefore, the use of this facility has been limited.

With the availability of the bonded-warehouse facility for major garment exporters and carpet exporters having access to duty free raw wool imports, even an effective duty drawback facility will not be a major export promotion instrument. Nevertheless, it could play an important supplementary role in providing exporters with access at free trade prices. Potential users could be smaller garment producers which export only part of their production, carpets exporters wishing drawbacks on duties paid on dyes, leather exporters, possibly some handicraft exporters and, potentially important, producers selling their products within the country for foreign exchange. The latter could include steel and plastic construction material industries supplying to infrastructure projects financed in foreign exchange. Already, the steel products industry presently is the main industry utilizing the facility of the 24 applications per duty drawbacks submitted during the fiscal year 1991/92 (until March), 17 applications were based on steel products domestic export sales. So far, the duty drawback system has been designed to benefit exporters to third countries. However, it could also be an important instrument to promote exports to India.

Efforts are being made by the National Planning Commission to develop a more effective duty drawback system. The proposed system is based on standard input-output coefficients, which are now being estimated for the main export products, specifying the entitled amount of duty drawback. These input-output coefficients cover all potentially imported inputs, whether, they are directly imported or not. This system would therefore also cover indirect imports. The earliest way to administer the reimbursement of the duties is to channel the whole amount to the final exporter, irrespective of whether he has actually imported the inputs. A system of fixed duty drawbacks for each commodity has to be additional advantage that it will act as an incentive for enhancing efficiency in the use of inputs.

It is not yet clear, when the proposed revisions in the duty drawback system will be implemented. Improvements in the implementation have been announced in the new commercial policy, but this policy document did not specify the type of improvement to be introduced.

3.8 1992 Trade Policy

The trade policies hitherto pursued by Nepal simultaneously aimed at inward and outward looking goals. Measures like duty drawback could not be implemented because of a lack of mechanism. Anti-export bias continued due to absence of realistic exchange rate and existence of highly protected domestic industries. In 1992, new trade policy was designed to provide more roles to the private sector and to accelerate trade-led growth of the national economy. In an effort to correct the exchange rate distortion, Nepal adopted partial convertibility in 1992. Therefore, two exchange rates existed: market rate and official rate. In the first stage, 65 percent convertibility was introduced which was later raised to 75 percent. In 1993, full convertibility on current account was introduced. Within less than one and half year, Nepalese currency was made fully convertible on current account. However, it will take some time to introduce convertibility on capital account.

3.9 Import Regime

The import regime in Nepal has largely developed to prevent trade deflection to India, which had a highly protected trade regime until recently. Nepal, however, has a long porous border with India, which makes it easy to smuggle goods to India. Imports deflected to India, are paid for in foreign exchange, whereas the revenues are in Indian currency. Therefore, such imports are considered a drain of foreign exchange. Nepal had to introduce sufficiently high barriers to imports to prevent trade deflection. Nevertheless, in practice trade deflection has never been fully prevented. Of course, given the size of the Indian economy, trade deflection at a limited scale does not have a significant impact on the effectiveness of its protective regime. Nepal's import regime was therefore not primarily designed to provide protection to an emerging manufacturing sector. Nevertheless, in practice, the import regime made investment in several lines of manufacturing activity more attractive and resulted in some import substitution type of industrial development. In addition, the industrialists involved in import-substitution industries have become a vocal lobby in favor of maintaining protection accorded to them

3.10 Import Trade Regime

In March 1992, with the introduction of partial convertibility, considerable changes were introduced in the import trade regime, involving deregulation of large share of commodity imports. A comprehensive description of the import trade regime prevailing until March 1992 is presented in the Stamp Report. At present third country imports in Nepal can be classified under three broad categories.

- commodities imported at the official exchange rate;
- auction imports
- OGL imports.

Detail descriptions are reported in NEI/ADB, Nepal Policies and Programs for Industrial Development, 1992.

3.11 Tariff Regime

All commodity imports into Nepal are governed by a system of import tariff. Most import tariffs are expressed in ad-valorem terms as a percentage of the c.i.f. import value. There are also a number of specific import duties (on some 20 out of 2300 items), mainly covering spirits, petroleum products and cement. The import duty system was substantially reformed with the introduction of the New Industrial Enterprises Act (IEA) in 1987. This reform reduced tariff rates from 87 to 10 basic rates and to four additional duty rates. Maximum tariffs were reduced from 450 percent to 100 percent.

The present import duty system is composed of two parts. The basic import duty and additional import duty. The later are added to the basic import duties of third country imports. The basic import duties apply to imports from India. In recent years, only minor changes have been made in the basic import duty rates. Between 1988/89 and 1991/92, out of some 2300 import items, only the basic duty on some 175 items changed most of which 5% either upward or downward.

The additional customs duty rates are regularly adjusted both upwards and downward. Additional duty rates over the past few years and their relation to basic duties are presented in Table 3.1:

Table 3.1: Additional duty rates over the years

Rates of basic duty	Additional duty			
	1992	1991	1989	1988
5 and 10 percent	15	25	10	25
15 and 20 percent	30	35	20	35
25 and 30 percent	40	45	25	45
50 percent and above	50	55	30	55

There is a wide range of special provisions in the import duty system. Imports from Tibet receive a 50% discount on the additional tariffs. Imports from member countries of SAARC are subject to 5 percent reduction in additional duties. Furthermore, ranges of product categories are exempted from the additional tax. It appears that, in general, industries are exempted from paying additional import duties

On most of their imports including imported machinery and intermediates. Only for so called assembly industries a 15 percent additional customs duty is levied on imports of intermediates. An 80 percent reduction of the additional duty is allowed on imports of plastic and copper-based intermediates, if public trading companies for distribution to cottage industries imports them.

3.12 Protective Structure before Liberalization

Table 3.2: Ranking of Industrial Activities by Level of Effective Rate of Protection

Activities	Effective Rate of Protection
Low Level of Incentives	
Bidis	-44.94
Noodles	1.09
Flour & Bran	9.14
Wood and Wood Products	11.72
Rice and Bran	12.67
Cotton Textile	18.67
Dairy Products	30.10
Sugar and Molasses	38.76
Moderate level of Incentives	
Animal Feeds	44.87
Insence sticks	47.15
Pasmina (swals)	50.03
Stone Products	51.75
Bakery and Confectionery	55.55
Matches	57.61
Synthetic yarn	66.84
Paints	68.29
Wax Candles	69.24
Spices	75.95
Medicines	79.50
High level of Incentives	
Dhaka Cloth & Products	89.26
Bricks	94.26
Iron and Steel Products	98.36
Chalk	101.20
Cement Blocks	107.33

Leather & Products	121.48
Plastic Wares	138.89
Soap and Detergents	142.57
Brass, Aluminum & Copper Goods	155.36
Vegetable oil	158.83
Plastic Pipes	161.93
Ceramic Tiles	176.98
Silk Fabrics	181.44
Catchu (Dyed Flour)	191.83
Hand Pumps	194.23
Paper and Paper Products	194.36
Synthetic Textiles (Mainly)	195.56
Footwear	457.21
Cushions and Mattresses	538.62
Steel Furniture	585.75
Electronics Assembly	642.05
Alcohol	761.18
Jute & Jute Products	786.52

Source: Nepal Industrial Sector Study, ADB/Manilla, 1990

3.13 Domestic Tax Reform

In the domestic taxes front, the reform program strengthen the revenue administration and broaden the tax base by constituting a separate revenue service within the civil service and withdrawing the tax incentives being provided to various economic activities. It also proposed to mobilize additional revenue every year amounting to 0.5 percent of GDP by tax changes. The program also proposed to reduce the highest tax rates. The top costumes tariff rate was reduced from 255 percent to 110 percent. The tariff slabs were reduced from 10 to 6. The top income tax rate was reduced from 45 percent to 33 percent and tax brackets were also reduced from 8 to 4. Dozens of domestic industrial products were removed from the excise net in order to simplify the tax system. The sales tax rates were also reduced from 5 to 2 of only 10 and 20 percent. Previously the sales tax rates ranged from 5 to 40 percent. Furthermore, the sales tax was made a single rate of 15 percent. In addition, VAT ACT was enacted since Mid-July 1997.

3.14 External Shocks

Nepal being a land locked country, she has to face various constraints to expand her trade. She has faced time and again transit difficulties. Until recently, Nepal has only one transit route via Calcutta of India. Now, Bombay's port is also available for Nepal. Recently, India has agreed to provide Fulbari port of Bangladesh.

Nepalese economy has also faced the usual trade shocks emanating from external sources such as the oil price hike of 1973. In addition, Nepal also witnessed trade impasse with India during 1988-90, when India closed all but two entry points to Nepal and adheres to MFN relations instead of preferential relation existing before. Political changes of 1990 brought status quo ante in India Nepal relations and brought normalization in trade relations.

Given the long and open border with India, Indian policies constrain independent policy move from Nepal. Therefore, policy making in Nepal should always monitor the policy shocks exerted by the Indian economy. Nepal could not manage trade deflection if the price implication is to high to attract unwanted trade. This is applicable to fertilizer subsidies, grain prices in general and import substitution.

CHAPTER IV

LABOR MARKET, INCOME DISTRIBUTION AND POVERTY

4.1 Labor Market and Employment

As in other developing countries, the labor market is segmented between modern and traditional sectors. The modern sectors accounts very low in terms of output and employment. The vast majority of the rural areas have witnessed very few development initiatives to change their life and mode of living. In the following paragraphs, we will briefly summarize the characteristic feature of Nepalese labor market

4.1.1 Structure and Growth of Labor Force

In 1991, Nepal had a population of 18.5 million. Estimates, based on a growth rate of 2.3 percent/year indicate a population of 21.1 million in 1996. A significant proportion of the population is very young. Approximately 31 percent of the population are below 10 years of age; another 12.4 per cent are between 10-14 years of age; and 5.5 percent of the population is above 60 years of age. Further, almost 88 percent of the population is in rural areas. Only12 per cent of the population resides in urban area and agriculture forms the primary occupation of 81 percent of the population. Characteristically, participation in work starts from an early age. Official data, including the decennial censuses, report on work participation of population of age 10 years and above. The work participation rate in the country has remained high, at 71 percent in 1996 compared with 65 percent in 1981 and 57 percent in 1991.

Analysis of the labor force distribution by ecological regions shows the trend in the stock of labor force generally followed the trend in population growth; that is, the share of labor force has been declining in the Mountains and Hills, while it has been growing in Terai. The rate of work participation is highest in the Mountains and lowest in the Tarai. Low work participation is highest in the mountains and lowest in Terai. Low work participation in Terai is largely due to relatively lower female work participation.

The distribution of work participation by major industry groups helps to clarify both the nature of work and the work force in Nepal. A very large proportion (four-fifths) of the workers/laborers is engaged in agriculture. Almost all agricultural land is privately held at the household level. Holdings are generally very small. More than 40 per cent of all holdings are under 0.5 ha in size and nearly 70 percent are under one hectare. Per capita landholding, the principal productive resource for majority of the population, is only 0.15 ha. However, inequality in land ownership is high(Gini coefficient 0.54). Only 9.5 percent of the agricultural land are under perennial irrigation. Another 25 percent is intermittently irrigated, i.e., during the rainy season (CBS 1993). Cropping intensity, which has been increasing in the last two decades, is approximately 1.7 (NRB 1994). Crop diversification is at low level, such that the demand for work peaks at just about the same period within the ecological regions. Agricultural productivity is very low, which is evident from the fact that involvement of 81 percent of the economically active population in agriculture makes up only 42 percent of the GDP. Despite heavy dependence on agriculture, only half of the total households are observed to be food-secure (CBS 1997a). Per capita income in agriculture has deteriorated and the terms of trade remain biased against the agricultural sector. All of this contributes to a very low level of living for the vast body of agricultural households and workers. The service sector accounts for another 6 percent of the workforce. Only 3 percent of the population is engaged in industry of which two-thirds are in manufacturing (as a primary occupation). While a slow shift from agriculture to other sectors has been visible during 1981-1991, only 10 percent of the increased work force each year finds work in the non-agricultural sectors (ILO-SAAT 1997). The current rate of growth of working-age population is 3 per cent per year.

4.2 Unemployment, Underemployment and Employment

4.2.1 Unemployment

In 1984/85, the rate of unemployment was slightly above 3 percent (NRB, 1988). The rate in the rural areas was approximately 3 percent while it was slightly above 8 percent in the urban areas. In 1996, unemployment rate increased to 5 percent (CBS 1997b). The rural and urban rates remained slightly below 5 percent and more than 8 percent respectively. For 1997, however, the NPC has estimated a higher unemployment rate (14 percent) after making the necessary adjustment on the definition of economically active population and the work participation rate (NPC1997). The rate of unemployment varies significantly by ecological regions: 2.1 percent in the Mountains, 3.7 percent in the Hills and 6.5 percent in the Tarai (CBS 1997b).

4.2.2 Underemployment

In 1991 (CBS 1995b), almost 35 percent of the employed persons worked for less than eight months in a year. Similarly, the 1991/92 agricultural census shows that nearly 39 percent of the agricultural workers worked for less than 40 hours per week. The extent of underemployment in 1996 was 47 percent for the country as a whole and at the level of the ecological region, it was 51 percent for Tarai, 45 percent for Hills and 36 percent for the Mountains. On the other hand, the rate of underemployment is much higher in the rural areas than in the urban areas as evidenced by the fact that in the rural areas, only 52 percent of the labor force works for more than 40 hours a week compared with 62 percent in the urban areas (CBS 1977).

4.2.3 Wage Employment

In 1996, only 21.7 percent of all workers were in wage employment, 12.2 percent in agricultural and 9.5 percent outside agriculture. Desegregation by location shows 21 percent (13 percent in agriculture and 8 percent outside agriculture) of rural work force and 43 percent (5 percent in agriculture and 38 percent outside agriculture) of the urban work force in wage employment.

Wage workers labor under a precarious regime because of the fact that no minimum wage legislation is in effect. Similarly, provisions for wage indexation, incentive packages for compensation and adequate social security have not been introduced in the labor market. Actually, the existing level of wage income is insufficient even to meet the minimum caloric requirement of the workers.

The high rate of inflation, which has averaged 10.6 percent during the last decade, together with a slow increase in nominal wages, has resulted in a downswing in real wages and level of living of the laborers. Adoption of the Structural Adjustment Program (SAP) since the mid-'80s has also had a significant bearing on this downswing. The SAP normally includes a strategy to freeze nominal wages so as to ensure competitive advantage due to exchange rate depreciation. In part, because Nepal accepted nominal-wage freeze as one of the conditionalities under the SAP since 1986, the rise in nominal wage was very low compared to the rise in prices during the last decade. As a result, real wages, both in agriculture and manufacturing, either did not improve significantly or slid down outright. In the civil service, the salaries and allowances of the non-officer level employees in 1996 remained below those in 1985 in real terms.

No minimum wage has been fixed for the unorganized sectors, mainly agriculture, which accounts for 56 percent of the wage employment. The minimum wage fixed by the government in the organized industrial establishments employing more than 10 workers is Rs. 1,000/month for unskilled labor and Rs. 1,350/month for highly skilled labor. Daily wage in the organized sector is fixed at Rs. 40/day. In the tea estates in the eastern region, where a large number of laborers are concentrated, the minimum wage is fixed at Rs. 850/month or Rs. 34/day.

The minimum wage levels are insufficient even to cover consumption at the subsistence level. Even if only the need for minimum calorie intake is taken into consideration, the cost exceeds Rs. 1,800/month. Other incentive categories, which upscale wages, are very few and provide a low level of benefit. Even gratuities and provident-fund facilities do not cover a considerable part of the wage-earners in the organized sectors. As wage-indexation is not under practice, real wages are not protected from going down due to a rate of inflation, which is higher than the rate of increase in nominal wages.

4.2.4 Self-employment

Of all workers(including those who are wage-workers), nearly four-fifths are self-employed. While the scale of self-employment is very high (57 percent) in urban areas as well, it is even higher (80 percent) and dominating in the rural areas. According to the Population Census of 1991, 92 percent of the work-force in the mountains, 84 percent in the hills and 74 percent in the Tarai were engaged in agriculture. Interestingly only 8 percent of the workers in Mountains worked as wage laborers, whereas the share was 13 per cent and 35 per cent in the hills and Tarai respectively (ILO-SAAT 1997). The remaining large proportion of work force was self-employed, including unpaid family workers. The 1996 NLSS data set also largely corroborates 1991 census data.

4.2.5 Migratory Employment

Migratory movement of labor (defined as inter-district/international out-migration for work) is relatively large in scale and has been further strengthened in the last three decades. Such movements can be divided into two categories, seasonal (or circular) movement and permanent movement. While both streams of movement are highly significant in scale, most data sets have failed to capture the scale of seasonal stream adequately. There is enough evidence, however, to indicate that the seasonal stream is large in scale.[6] Lack of work in the Mountain and Hills during the slack agricultural season in the winter, annually force a large

[6] See Fe. McDougal (1968); Okada (1970); Dahal, Rai and Manzardo (1977); Mishra, Pandey and Uprety (1993).

number of workers to Tarai and cities and towns of Nepal and India looking for work. Such a migratory stream has been noted to be extremely large in the mid-western and Far Western Mountains and Hills. It has been noted that more than one-half of all households are involved in such a routine. It has further been noted that income from migrant labor forms a high proportion of the total household income for the seasonal migrants' households. In addition, seasonal migration is no longer limited to peoples from the Hills; the routine has picked up considerably among the peoples in Tarai as well, who mostly migrate to urban areas in Nepal or to the green revolution areas of North India.

The censal and some other data sets, however, do capture the scale of permanent migration. Data from different population censuses show that 0.44 million people during 1961-1971, 0.93 million during 1971-1981 and 1.23 million during 1981-1991 migrated permanently. Censal data also show that during 1981-1991, 3.5 percent of the population in Mountains and 5.9 percent of the population in Hills moved away permanently, mostly to Tarai. While not all of these were labor-migrants- "Marriage migration" and Migration of the better-off" are significant in size as well, and the censal data are not discriminating enough- the migrant population as proportion of the *total* population was 2.9 percent, 1.6 percent and 2.4 percent in 1971, 1981 and 1991 respectively. While the landless, the highly indebted and members of the "low caste" groups appear to migrate in larger proportions, even the relatively well-off individuals and households join the ranks of labor migrants. Most international out-migrants work in India. But approximately 12,000 laborers are also reported to be working in countries other than India.

A third migratory stream, that of in-migration, principally from India, is also sizable and significant. Migrant workers from India, whether seasonal or permanent, can be found engaged in various sectors, e.g., agriculture, industry, construction and informal sector trades. While the number of such workers is large in the agricultural sector, in terms of proportion, they are quite significant in the manufacturing sector where they form nearly 13 percent of the total (manufacturing sector) workers (ILO-SAAT1977), e.g., tea estates, carpets, printing press, rice mills, metal works, etc.

4.2.6 Work in the Informal sector

In 1992, the total number of workers employed in the organized sector was 0.22 million (CBS 1994 a). Subsequent surveys relating to the industrial sector have put the number of in the manufacturing sector at 0.35 million. If the number of government employees (0.34 million is added to this, the number of organized-sector workers stands at 0.69 million or 7 percent of the total employment (figure for 1993). The World Bank estimate for 1993, on the other hand, puts employment in the organized sector at 0.97 million, which is almost 10 percent of total employment (ILO-SAAT 1997). Another estimate, which regards the agriculture sector as a totally unorganized sector, puts total employment , in the organized sector at 0.84 million (or 8.5 percent of the total employment including self-employment) (ILO-SAAT 1997).

Despite variations in measurement, the organized sector covers only a small proportion (7 to 10 percent) of all workers. Smallness of the organized sector, among others, implies that wage legislative process would impact only a small body of laborers. The wage-based informal sector, on the other hand, is characterized by diversities in wage rates, conditions of employment, and discriminations based on gender and age.

4.2.7 Women and Directly Productive Work

According to the 1991 census, the directly productive work-force participation rate among women is approximately 46 percent compared to approximately 69 percent for men (CBS 1995b: 466). The 1996 NLSS data set, on the other hand, reports a rate of 66 percent for women (and 75 percent for men). Another 1996 data set (MOH 1997c: 28) reports a 77 percent participation rate for women 15-49 years of age and tends to corroborate the NLSS data set. While definitional issues lie at the heart of such a divergent measurement, and while reproductive and householding works do limit women's involvement in directly productive work, extant literature as well as experience tell us that very few women keep away from directly productive work for long periods in the rural and agricultural areas of Nepal. It is this agricultural sector, it must be emphasized, which overwhelmingly dominates women's directly productive work routine: in 1991, 90 percent of all "economically active" women, in contrast to 75 percent of men, were engaged in this sector (CBS 1995b). Only four percent of all "economically active" women, in contrast to 12 percent of men, are in formal sector employment.

Only 35 percent of all farm families employ others for farm work. The rest, two-thirds of all farm families, work on their own with occasional assistance of casual agricultural labor and/or long-term dependent workers. Since wage employment is relatively limited in magnitude and since men are the main beneficiaries of such wage work, demand for women wage workers is high only during the planning and harvesting seasons: only a very small proportion of women is in permanent wage employment in agriculture. On the other hand, most women participate in unpaid inter-household exchange of agricultural labor (*Parma labor system).*

4.2.8 Women and Underemployment

Various studies and surveys reveal a lower labor participation rate for females than for males, and hence a higher rate of underemployment for females in relation to males. The NLSS survey (CBS 1997a) shows an activity rate of 66.4 percent for the female labor force compared to 71 percent for the male. Although unemployment rate for women (4.1%) is lower than that for men (5.6%), the underemployment rate for women is much higher than for men. The situation of gainful employment is more distressing for the employed women.

4.2.9 Women and Income Earning Opportunities

Women contribute a substantial portion of the country's labor force. The share of women in the total labor force was 45.5 percent in 1991, a slight decline from 46.2 percent in 1981. Women work longer hours than men do. Women spend much more time than men on subsistence activities and domestic work. In these activities, the workload of women exceeds that of men by more than 25 percent (NPC/UNICEF 1992). Subsistence activities also confine women to conventional activities including domestic work and agricultural labor. A pioneering study on the status of women in Nepal (CEDA 1979) revealed that 86 percent of all domestic work and 57 percent of subsistence agricultural-activities were undertaken by women. Women's contribution to household income is estimated at 50 percent compared to 44 percent for men and 6 percent for children (Acharya 1979).

Various census and survey reports show a lower rate of participation of women in economic activities compared to that of men. There has been no improvement in the rate of female participation in economic activities through the last decade. In 1981, 46.2 percent of the total female population were participating in economic activities. This figure declined to 45.5 percent in 1991. Despite the fact that the bulk of the household work such as crop farming, kitchen gardening, livestock raising and forestry development is done by women, their recorded low participation is indicative of the dearth of gender-sensitive data in Nepal.

There has been a drastic reduction in participation of urban women population in economic activities, falling from 31.5 percent in 1981 to 20.3 percent in 1991. Similarly, their share in labor force fell from 26.4 percent in 1981 to 23.8 percent in 1991. This shows the negative effect of urbanization on women's participation in labor force. Participation of women in agricultural and manufacturing activities has gone up, which remains at around 20 percent of the total population (Acharya 1997).

The pattern of work participation indicates a large proportion of women working as unpaid family workers. The proportion is 63 percent for women and 24 percent for men. Region-wise, the proportion of women engaged in unpaid family works is 75 percent in Tarai and 55 percent in the Hills. The proportion of unpaid men workers in these regions is respectively 25 and 23 percent. Interestingly, the proportion of unpaid female workers is higher in the urban areas than in rural areas. Which means urbanization has adversely impacted on women's income earning opportunities.

Majorities of women are involved in agriculture and personal and community services, where income generation is very low. On the other hand, their participation in income generating activities such as commerce, transportation, industry, and electricity, gas and water is very low. Women's participation as a ratio of men's participation amounts to 42 percent in industry, 39 percent in commerce and only 11 percent in transport and construction.

4.2.10 Child Labor

In Nepal, children in the 5-14 age group numbered 5.7 million in 1996. In 1991, the number of economically active population in the age-group 10-14 years was more than half-a-million. In 1996, the number was estimated to be more than 1 million which constitutes around 10 percent of the total work force (CBS 1995b, 1997a). The proportion of economically active children declined drastically during 1981-1991. For the 10-14 age group, the proportion of the economically active population declined, during the same decade, from 57 percent to 23 percent, although a far higher proportion of boys than girls benefited from this transition. Increased enrolment in schools, particularly of boys, has been noted to have contributed to this decline.

4.3 Income Distribution, Consumption and Poverty

4.3.1 Household Income

The NLSS (CBS 1997) shows Nepal's average per capita income as $142 (with a regional variation as follows: $298 for urban areas, $131 for rural areas, $446 in Kathmandu, $146 in Eastern Tarai, $110 in the Mountains and $107 in Western Tarai). Farm income is the major source of household income accounting for 61 percent of the total household income in 1996. Income from non-farm enterprises accounted for 22 percent and income from other sources (mainly financial assets) accounted for 16 percent of the total household income. Urban income is more than double the rural income levels.

Farm income, as a proportion of household income was 65 percent in the rural areas and 16 percent in urban areas. The share of wage income in household income has been relatively low (27 percent) in the rural areas compared to that in urban areas (36 percent). By consumption group, the share of farm income was highest for the lowest consumption quintile of households. The same applies for the shares of wage and non-wage income: for the lowest consumption quintile of households, share of wage income in total income was as high as 35 percent and only 23 percent for the highest consumption quintile.

In recent years, income distribution appears to have worsened: the Gini coefficient for 1996 was 0.34 in comparison to 0.24 in 1985. Income disparity tends to be wide in the urban areas where the Gini coefficient went up from 0.26 in 1985 to 0.43 in 1996. Although the parameters are not directly comparable because of differences in sample areas and their size, they nevertheless hint at the deterioration of income distribution over the decade. The coefficient for Tarai is highest, indicating the greatest income inequality (0.66). Its value was lowest (0.21) in the mountain region. Although there is little variation in income distribution across the ecological regions, wide variations exist between the rural and urban areas. The average household income in Kathmandu is double that in other urban areas and nearly four times that in the rural areas.

The income distribution pattern as a share of total income gives a more revealing picture of the concentration of income (NRB 1988 and CBS 1996). MPHBS shows that the bottom 40 percent of population shares only 23 percent of total income while the top 10 percent claim 23 percent. Regionwise, the share of the top 10 percent of population in rural income ranges from 13 percent in the Mountains to 23 in Tarai, and the share of the bottom 40 percent ranges from 23 percent in the Hills to 33 percent in the Mountains. The income share in urban areas ranges from 24 to 27 percent for the bottom 40 percent of population and 20-21 percent for the top 10 percent of population. Income distribution is more uneven according to the NLSS: the share of the bottom 40 percent people in total income is just 11 percent and that of the top 10 percent is as high as 52 percent (CBS 1996).

There is a strong relationship between the size of landholding and household income. In 1985, the household income of large farm households was nearly 3 times higher than that of the marginal farmers (NRB 1988). Similarly, household income of the large farm households was more than 50 percent higher than that of the medium size households, and nearly double the income of small size households. The average income of the landless households in the rural areas was just one-third that of the large size household. This indicates the positive association between household income distribution and size of landholding.

4.3.2 Inequalities in Land and Income Distribution

The Gini Concentration Ratio (GCR) in the land distribution is highest in the *terai* region followed by the mountain and the hill region, and the GCR in the income distribution is highest in the mountain region followed by the hill and the *terai* region (Table 4.1). Despite the highest GCR in the land distribution in *terai* region, the lowest GCR in income distribution is mainly due to the high contribution of non-farm income among the landless and marginal farm households. Micro-analysis of the data shows that the contribution of non-farm income among the landless and marginal farm households in mountain and hill regions is not as high as among those of the *terai* region.

Table 4.1: Gini Concentration Ratios in Land and Income Distribution in Three Regions

	Terai	Hill	Mountain
GCR in Land Distribution	0.5234	0.4154	0.4443
GCR in Income Distribution	0.3490	0.3847	0.4136

Source: Calculated from NRCS 92 for MIMAP

4.3.3 Sources of Income by Decile

Agriculture makes a significant contribution to the income earnings of the residents of the three regions. The estimated contributions of agriculture, as measured by the average percentage share, are 54.0, 53.5 and 57.8 per cent among the residents of terai, hill and mountain regions.

The contribution of agriculture in income generation vary considerably over the decile groups. It ranges from 46.3 to 59.9 per cent over the decile groups of the terai region, 45.2 to 60.8 per cent over the decile groups of the hill region and 53.6 to 62.9 per cent over the decile groups of the mountain region. The contribution of agriculture tend to be low for the lower income earning groups and high for the higher income earning groups of the terai region. In fact, the contribution of agriculture for each of the five lower income groups of the terai region is less than that of non-agriculture. On the contrary, the contributions of agriculture tend to be high for the lower income earning groups and low for the higher income earning groups of the hill and mountain regions. These results are confirmed by estimates of the correlation coefficients between the average shares of agriculture and the per capita total income of decile groups (0.58 in the terai, -0.92 in the hills and -0.56 in the mountains).

Table 4.2: Agricultural, non-agricultural and total per capita income and share of agriculture by decile group in three regions

(per capita income in Nepali Rs)

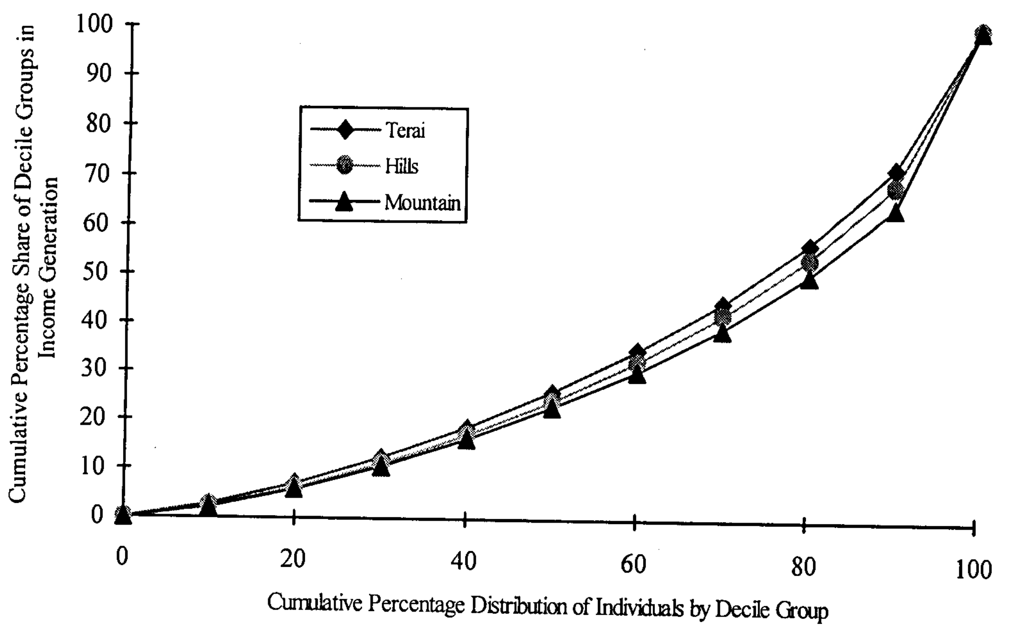
	Per capita Income			Percentage Share
	Agriculture	Non-Agriculture	Total	of Agriculture
A.Terai				
First	572	595	1167	49.02
Second	871	910	1782	48.89
Third	1025	1188	2213	46.31
Fourth	1225	1394	2619	46.77
Fifth	1467	1629	3096	47.38
Sixth	1990	1601	3591	55.42
Seventh	2255	1867	4122	54.70
Eighth	2907	2104	5011	58.01
Ninth	3863	2584	6447	59.92
Tenth	6296	5281	11577	54.38
Overall	2248	1916	4165	53.99
B.Hill				
First	598	399	997	59.99
Second	969	645	1614	60.05
Third	1188	879	2068	57.47
Fourth	1507	1001	2508	60.08
Fifth	1625	1320	2945	55.19

Sixth	2097	1350	3447	60.83
Seventh	2337	1711	4048	57.73
Eighth	2831	2083	4914	57.62
Ninth	3354	2931	6285	53.37
Tenth	5949	7212	13161	45.20
Overall	2246	1953	4199	53.48
C.Mountain				
First	578	419	997	58.00
Second	998	647	1646	60.66
Third	1213	907	2120	57.23
Fourth	1458	1055	2513	58.02
Fifth	1857	1049	2906	63.89
Sixth	2030	1298	3328	61.00
Seventh	2318	1656	3974	58.33
Eighth	3076	1816	4892	62.88
Ninth	3651	2532	6183	59.05
Tenth	8489	7348	15838	53.60
Overall	2572	1877	4449	57.82

Source: Calculated from NRCS'92 for MIMAP

The Lorenz Curves in Figure-1 summarize the inequality in the distribution of income in three regions. The Lorenz curve corresponding to terai is closest to the egalitarian line (the 45 degree line passing through the two extreme points of the curve), while the Lorenz curve corresponding to mountain is farthest from the egalitarian line. These results imply that the inequality in income is highest in mountain followed by hills and terai.

Figure 4.1: Lorenz Curve showing Inequalities in Per Capita Income in three Regions



Crop and Livestock Income: In the present analysis the agricultural income is estimated from two sources: crop and livestock. The estimates of per capita crop, livestock and agricultural income, average percentage share of livestock income, average income per hectare of agricultural income and average operational land holding of each income decile group for the terai, hill and mountain regions are presented in Table 3.3. Regional variations in the contribution of livestock income to agricultural income, as measured by the percentage share of livestock, are quite considerable: 17.07 per cent in the terai, 35.71 per cent in the hills and 26.28 per cent in the mountains. The contribution of livestock tend to be low among the lower agricultural income earning groups and high among the higher agricultural income earning groups. In mountain region, the middle decile groups tend to have higher level of livestock contributions as compared to the lower or higher decile groups.

The average operational land holding of lower agricultural income earning groups is relatively high as compared to the national figures[7]. An important implication of this result is that the lower income earning farm households are not only landless and marginal but also small, medium or large sized farm households. The four lower income decile groups of terai, for example, cover 45 per cent of landless, 48 per cent of marginal, 36 per cent of small sized farm households, 24 per cent of medium sized farm households and 17 per cent of large sized farm households[8].

The lower income earning groups fail to receive as much income as they should from their land mainly due to low land productivity, as measured by the average income per hectare of land. Land productivity tends to be low for the lower income earning groups and high for the higher income earning groups of the terai, hill and mountain regions. These results are confirmed by a high correlation coefficient (higher than 0.9) between the average agricultural income per hectare of land and per capita agricultural income of decile groups.

Table 4.3: Decomposition of agricultural income, share of livestock, productivity and land holding by decile group

	Per capita income from			Percentage	Agricultural	Operational
	Crop	Livestock	**Agricultur e**	**Share of livestock**	**Income per Ha of land**	**land Per household**
A.Terai						
First	483	89	572	15.56	4703	0.85
Second	753	118	871	13.55	8151	0.75
Third	897	128	1025	12.49	8073	0.84
Fourth	1030	195	1225	15.92	8991	0.83
Fifth	1232	235	1467	16.02	9804	0.95
Sixth	1671	319	1990	16.03	11826	1.09
Seventh	1819	436	2255	19.33	10722	1.33
Eighth	2428	480	2907	16.51	13145	1.29
Ninth	3010	853	3863	22.08	13877	1.57
Tenth	5314	982	6296	15.60	15504	2.43
Overall	1865	384	2248	17.07	11674	1.22
B.Hill						
First	469	129	598	21.57	5833	0.67
Second	715	254	969	26.21	9092	0.68
Third	884	305	1188	25.65	9228	0.82

7 According to 1992 Agricultural Census, the average operational land holding in terai, hill and mountain are 1.26, 0.77 and 0.68 ha, respectively.

8 In this study farm households are classified in five categories according to their farm size (NRCS (1995)) : landless up to 0.05 ha, marginal 0.05 to 0.5 ha, small 0.5 to 2.0 ha , medium 2.0 to 4.0 ha and large above 4.0 ha.

Fourth	1049	457	1507	30.35	10591	0.94
Fifth	1119	506	1625	31.14	11325	0.92
Sixth	1360	737	2097	35.15	13544	0.99
Seventh	1485	852	2337	36.46	14001	1.05
Eighth	1865	967	2831	34.15	14527	1.16
Ninth	2114	1240	3354	36.97	17878	1.14
Tenth	3375	2574	5949	43.27	23030	1.39
Overall	1444	802	2246	35.71	14158	0.99
C.Mountain						
First	488	91	578	15.72	7774	0.43
Second	809	189	998	18.94	10943	0.57
Third	793	420	1213	34.62	12478	0.57
Fourth	965	493	1458	33.81	12102	0.74
Fifth	1213	645	1857	34.71	11748	0.96
Sixth	1411	619	2030	30.49	13970	0.85
Seventh	1568	749	2318	32.33	13691	0.98
Eighth	2075	1001	3076	32.54	14194	1.23
Ninth	2408	1243	3651	34.05	14834	1.36
Tenth	7187	1303	8489	15.35	26609	1.74
Overall	1896	676	2572	26.28	15684	0.96

Source: Calculated from NRCS'92 for MIMAP

4.3.4 Operational Land-Holding

The estimates of per capita operational land for the terai, hill and mountain regions are 0.1926, 0.1586 and 0.1640 hectare, respectively. In terms of per household these estimates are correspondingly 1.22, 0.99 and 0.96 hectares. The spatial variation in the share of owned land in operational land is quite significant. The estimates for the terai, hill and mountains are 78.93, 94.00 and 88.33 per cent, respectively. The lower sized land holders tend to have low shares of owned land and higher sized land holders tend to have high share of owned land in each region.

The four lower operational land holding groups of the terai and hill regions heavily depend upon the non-agricultural activities for their livelihood. Their per capita non-agricultural income is significantly higher than the per capita agricultural income. The four lower decile groups of terai cover 100 per cent of landless farm households, 86 per cent of marginal farm households and 13 per cent of small farm households; and the four lower decile groups of hill cover 100 per cent of landless farm households, 81 per cent of marginal farm households and 18 per cent of small farm households. Likewise, the three lower operational land holding groups of the mountain region heavily depend upon non-agricultural activities for their livelihood. These three groups cover 100 per cent of landless farm households, 60 per cent of marginal farm households and 7 per cent small farm households of the sample.

The lower operational land holding groups tend to show relatively high levels of average land productivity and the higher operational land holding groups tend to show relatively low levels of land productivity. This result is confirmed by the correlation coefficient between the land holding and income per hectare of operational land: -0.51 in the terai, -0.72 in the hills and -0.60 in the mountains.

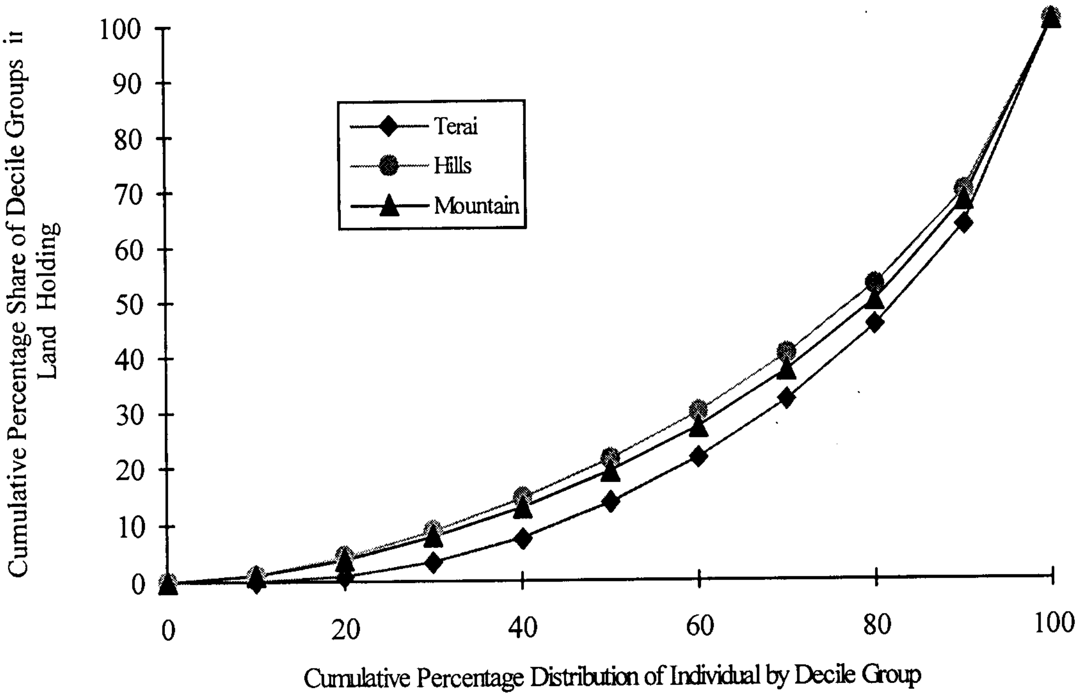
Table 4.4: Per capita land and income, average share of owned land and income per hectare of farm land of land decile groups

	Per Capita Land			Per Capita Income			Share of	Income Per
	Owned	Rented	Operational	Agriculture	Non Agriculture	Total	owned land	ha of land
A.Terai								
First	0.0011	0.0006	0.0017	134	3025	3169	66.67	79042
Second	0.0135	0.0022	0.0157	444	3470	3914	85.71	28210
Third	0.0383	0.0090	0.0473	969	2007	2976	80.95	20491
Fourth	0.0607	0.0197	0.0804	1409	1690	3099	75.52	17515
Fifth	0.0936	0.0237	0.1173	1823	1780	3603	79.81	15537
Sixth	0.1232	0.0310	0.1542	2125	1772	3897	79.93	13782
Seventh	0.1540	0.0464	0.1999	2659	1384	4043	77.05	13302
Eighth	0.1996	0.0553	0.2549	3188	1196	4384	78.29	12509
Ninth	0.2636	0.0877	0.3513	4066	1280	5346	75.04	11573
Tenth	0.5711	0.1304	0.7015	5651	1563	7214	81.41	8056
Overall	0.1520	0.0406	0.1926	2248	1916	4165	78.93	11674
B.Hill								
First	0.0164	0.0023	0.0187	832	2970	3802	87.80	44472
Second	0.0451	0.0050	0.0497	1199	1684	2883	90.83	24136
Third	0.0625	0.0073	0.0703	1493	1913	3406	88.96	21242
Fourth	0.0824	0.0064	0.0893	1714	1870	3584	92.35	19204
Fifth	0.1019	0.0091	0.1105	1929	1614	3543	92.18	17459
Sixth	0.1236	0.0405	0.1345	2967	1488	4455	91.86	22056
Seventh	0.1514	0.0118	0.1623	2438	1981	4419	93.28	15014
Eighth	0.1935	0.0110	0.2045	2581	1645	4226	94.64	12621
Ninth	0.2492	0.0123	0.2619	3186	1996	5182	95.14	12163
Tenth	0.4647	0.0196	0.4843	4118	2375	6493	95.95	8502
Overall	0.1491	0.0095	0.1586	2246	1953	4199	94.00	14158
C.Mountain								
First	0.0139	0.0035	0.0174	709	1513	2222	80.00	40717
Second	0.0379	0.0052	0.0448	1172	1246	2418	84.62	26151
Third	0.0553	0.0104	0.0656	1378	1770	3148	84.21	20993
Fourth	0.0741	0.0103	0.0828	1795	1605	3400	89.58	21695
Fifth	0.0895	0.0155	0.1050	1851	1465	3316	85.25	17634
Sixth	0.1134	0.0172	0.1306	2245	1569	3814	86.84	17189
Seventh	0.1392	0.0241	0.1632	2267	1843	4110	85.26	13889
Eighth	0.1961	0.0193	0.2127	2925	2811	5736	91.74	13754
Ninth	0.2568	0.0304	0.2889	3604	2228	5832	88. 89	12477
Tenth	0.4707	0.0552	0.5259	7742	2724	10466	89.51	14722
Overall	0.1449	0.0191	0.1640	2572	1877	4449	88.33	15684

Source: Calculated from NRCS'92 for MIMAP

The Lorenz Curves in Figure-2 summarize the inequality in per capita land distribution in three regions. The Lorenz Curve corresponding to hills is closest to the egalitarian line and the Lorenz Curve corresponding to the terai is the farthest from the egalitarian line. These result imply that the highest inequality in per capita land holding is in terai followed by mountain and hills.

Figure 4.2: Lorenz Curve showing Inequalities in Per Capita Land Holding in three Regions



4.3.5 Land Ownership and Tenure

Only about 17 percent of the total land area of the country is comprised of agricultural land. The per capita landholding is 0.14 ha. Land ownership is highly fragmented. About 69 percent of landholding are less than one ha in size and about 89 percent are less than two ha. The average size of landholding is only 0.24 ha, with, on average, more than four lands parcel per holding (CBS 1993). Regional variation in the distribution of agricultural land is substantial. The Tarai covering only 17 percent of the total land area comprises 49 percent of the total agricultural land. The Hills and Mountains cover 63 and 20 percent of the total land area, and account for 40 Percent and 11 percent of agricultural land respectively.

The owners themselves apparently cultivate most of the agricultural land in Nepal - it accounts for 97 percent. The larger the size of landholding, the higher the proportion of land rented out: the proportion of land rented out is less than 5 percent for landholding of less than 1 ha, 11 percent for holding of more than 3 ha and more than 19 percent for landholding size of more than 5 ha.

The bottom 40 percent of the agricultural households operate only 9 percent of the total agricultural land area, while the top 6 percent occupy more than 33 percent. The concentration index for agricultural land is 0.54 reflecting a highly uneven distribution of the most dominant productive resource of the country (CBS 1997A). NLSS (CBS 1997A) indicates 40 percent of the agricultural households own less than 0.5 ha of land and 13 percent more than two ha. The proportion of households with less than 0.5 ha is as high as 46 percent in the Hills and 42 percent in the Mountains. Furthermore, about 20 percent of the households in Tarai have a holding of more than two ha, compared with only 6.6 percent in the Hills. These points to the relatively small size of landholding in the Hills, compared to the average size of landholding in the Mountains and Tarai. The smaller size of landholding in the Hills is also manifest in the higher incidence of poverty in this region.

The dominant type of land entitlement in Nepal is owner-tiller. About 85 percent of the operated land are owner-operated and the remaining 15 percent are rented in. Among the agricultural households, 95 percent operate their own land whereas 6.4 percent also rent out part of their land. About 29 percent of the households work on rented land along with their own land. About 5 percent of the households work on rented land only. Land system in Nepal is besieged by multifarious problems despite many attempts for reform. First, there is the problem of land tenure, which embodies dual ownership between the owner and the tenant, with neither party motivated to invest on land and benefit from the resulting gains. The rural credit survey (NRB 1994) reports that investment in land improvement is less than 3 percent of household income. The unequal distribution of land together with the very low size of holdings of the majority of the households is another problem. In addition, studies indicate deterioration in land fragmentation accompanied by a further fall in the average size of holdings.

4.3.6 Credit Access

Access to credit is extremely important for those households with inadequate savings of their own. The informal financial market is the sole source of credit for 80 percent of the borrowing households in rural areas. The remaining 20 percent borrow from formal financial institutions (NRB 1992). All borrowers of formal credit also access informal sources of financing. Distribution of formal sector credit remains highly unequal: in 1990 only 9 percent of the landless households had access to such credit compared to 38 percent of the large farm households. A more recent survey shows that 59 percent of the households are borrowers of one kind or the other; 35 percent in the urban areas and 66 percent in rural areas are borrowers (CBS 1997). Moneylenders and relatives account for more than 80 percent of total credit whereas the share of the banks is just 16 percent. Most of the loans (71 percent) is used for households consumption and personal expenditure only; 29 percent goes to business and production purpose. The lower income households tend to have a higher borrowing rate, and, correspondingly, incur larger volumes of debt finance consumption. The lowest consumption quintile of households uses as much as 62 percent of the loans for consumption compared with 42 percent in the case of the highest quintile (CBS 1997A).

Since the mid-'80s, there has been a landmark expansion in the financial institutions and financial products. The number of commercial banks has now increased from 2 to 11. Of them, nine are in collaboration with foreign banks. More than 40 finance companies and five rural development banks have come into operation within a period of five years. Besides, more than 30 NGOs and 20 cooperative societies are also conducting limited banking activities. The share of total deposits in the financial system increased from 18 percent of the GDP in 1985 to 28 in 1996, indicating a good deal of financial deepening in one decade. However, all these expansions have failed to cater higher level of formal credit in the rural areas. The lopsidedness of the financial system in favor of the urban sector has brought about many distortions in the system. First, the introduction of new financial services and products notwithstanding, lending practice is still traditional. More than 80 percent of the formal sector financing is collateral-based. Those who do not possess land and other bankable property have no access to such credit in areas where targeted and micro-credit programs do not exist.

Collateral-based lending practices have deprived the small, marginal and landless households of institutional borrowing opportunities. NLSS shows that 86 percent of the formal credit is issued against collateral in the form of land or other property and only 12 percent of borrowing are collateral-free. As 49 percent of the households possess less than 0.5 ha of land, and women are yet denied legal rights to parental property, pledging collateral for large loans is virtually impossible. Access to institutional credit similarly depends upon location, the purpose underlying the request for loan and social status of the borrower. These practices clearly discriminate against borrowers in the rural areas. The consequence is that households are compelled to resort to informal borrowing at exorbitantly high interest rates and to mounting indebtedness. Growing landlessness, migration, deprivation and poverty have in turn intensified their indebtedness. Besides, lack of credit has hindered utilization of labor, the only productive resource of the poor, in productive activities.

4.3.7 Targeted Credit Program

The programs which are targeted to the poor in Nepal are Small Farmers Development Program (SFDP), Production Credit for Rural Women (PCRW), Micro-Credit Project for Women (MCPW), Credit to the Deprived Sector, Rural Development Banks and credit operations of the NGOs engaged in banking services. Presently, more than 30 NGOs are also working as micro-credit institutions with permission to operate from the Nepal Rastra Bank. Together, they constitute an important channel of credit delivery to the grass-roots level along with other support services. Besides, the Intensive Banking Program (IBP) also takes into consideration the small and marginal income households for its credit operation. The common characteristics of most of these credit programs are: (a) they are targeted to specific sectors and people with low income; (b) they extend credit on group guarantee and with no physical collateral required; (c) they include in their programs other services along with credit; (d) their principal aim is poverty alleviation; and (e) they are external donor-dependent for resources. There are some exciting success stories related to some of these activities. In general, and from the standpoint of sustainability, however, these programs suffer from a variety of problems including high cost of service delivery, low rate of loan recovery and inadequate commitment of the concerned institutions. Erosion of cohesiveness among the group members constituted for credit and community building purposes and intrusion of partisan politics and donor agenda have also contributed to low performance - even in cases where the program was extremely successful at the initial stage.

4.4 Consumption Pattern

In the rural areas, food items constitute nearly two-thirds of the consumption expenditure, whereas these items account for nearly half of the consumption expenditure in the urban areas. Expenditure on other goods and services (such as clothes, housing, medicine and education) amounts to about 38 percent of the total consumption expenditure in the rural and 45 to 51 percent in urban areas.

The MPHBS (NRB 1988) shows that grains or cereal products constitute nearly 37 percent of the consumption expenditure followed by housing expenses (17.3 percent), clothing (11.7 percent), vegetable (5.3 percent) and medical and personal are (3.7 percent). Nearly 3 percent of the expenditure is spent on alcohol and tobacco; similar to the expenditure spent on education. The expenditure incurred on medical and personal care is only slightly higher than that on alcohol and tobacco.

The consumption is different in the rural areas in comparison with the urban areas. Households in the urban areas spend less than one-fourth of their total expenditure on the consumption of grains and cereal products compared to 38 percent in rural areas. On the other hand, households in urban areas spend 28 percent of their income on housing, as against 16 percent in rural areas. Similarly, households in urban area spend more on education, medical and personal care and other consumption (such as tea, sugar, fruits and sweets) compared to those in rural areas. However, as they have to spend a high proportion of their income on dwelling, income left for spending on education, health, recreation and personal growth is very low causing an impeding effect on human development.

Table 4.5: Average Household Expenditure by Consumption Items and by Area and Household Type, Nepal, 1995/96

	Mountain			Hills			Terai			Urban	Total
	S/M Farm	L-Farm	Non-Farm	S/M Farm	L-Farm	Non-Farm	S/M Farm	L-Farm	Non-Farm		
Food	22670	25205	17668	23352	30443	18715	20584	34079	15537	32735	23335
Tobacco	541	555	986	701	545	643	433	636	474	936	603
Education	570	671	2561	1112	1452	888	575	1833	415	5447	1232
Durables	124	227	1320	389	294	877	338	851	399	5847	795
House Rent	2822	2303	3733	3415	5774	5182	2447	4154	2527	22618	4572
Garbage						1				11	1
Electricity	121		164	95		185	44	111	82	1581	189
Telephone									12	375	29
Other Non-food	5948	9518	15584	6495	11010	8451	6878	10531	5348	13330	7433
Fuel	348	431	434	371	551	764	351	906	379	1518	498
Total	33123	38911	42450	35932	50068	35705	31649	53101	25173	84398	38687

Table 4.6: Percentage Distribution of Average Household Expenditure by Consumption Items and by Area and Household Type, Nepal, 1995/96

	Mountain			Hills			Terai			Urban	Total
	S/M Farm	L-Farm	Non-Farm	S/M Farm	L-Farm	Non-Farm	S/M Farm	L-Farm	Non-Farm		
Food	68.44	64.78	41.62	64.99	60.80	52.42	65.04	64.18	61.72	38.79	60.32
Tobacco	1.63	1.43	2.32	1.95	1.09	1.80	1.37	1.20	1.88	1.11	1.56
Education	1.72	1.72	6.03	3.09	2.90	2.49	1.82	3.45	1.65	6.45	3.18
Durables	0.37	0.58	3.11	1.08	0.59	2.46	1.07	1.60	1.59	6.93	2.05
House Rent	8.52	5.92	8.79	9.50	11.53	14.51	7.73	7.82	10.04	26.80	11.82
Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Electricity	0.37	0.00	0.39	0.26	0.00	0.52	0.14	0.21	0.33	1.87	0.49
Telephone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.44	0.07
Other Non-food	17.96	24.46	36.71	18.08	21.99	23.67	21.73	19.83	21.24	15.79	19.21
Fuel	1.05	1.11	1.02	1.03	1.10	2.14	1.11	1.71	1.51	1.80	1.29
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: CBS (1997), Nepal Living Standard Measurement Survey, Reprocessed from Computer Data File.

4.4.1 Consumption by Decile Group

Consumption expenditure is estimated for the two main expenditure items: food and non-food. Table 3.6 provides the estimates of per capita food expenditure, non-food expenditure, consumption expenditure, average household size, average children per household and food ratio[9] of each consumption decile group for the terai, hill and mountain regions. The main findings are as follows.

The estimates of per capita consumption expenditure for the terai, hill and mountain regions are Rs 3356, Rs 3314 and Rs 3387, and the estimates of per capita food expenditure are correspondingly Rs 2484, Rs 2369 and Rs 2500. The estimates of food ratio are 74.01, 71.47 and 73.81 per cent for the terai, hill and mountain regions, respectively.

Table 4.7: Per capita consumption expenditure, food ratio and children by decile group in three regions

	Per Capita Expenditure on			Food	Household	Children per
	Food	Non-food	Consumption	Ratio	Size	household
A.Terai						
First	1037	272	1309	79.21	7.60	2.74
Second	1379	368	1747	78.91	6.86	2.36
Third	1626	443	2068	78.61	6.87	2.28
Fourth	1850	507	2357	78.47	6.75	2.05
Fifth	2107	582	2689	78.34	6.36	1.80
Sixth	2374	665	3039	78.12	5.98	1.76
Seventh	2685	793	3478	77.21	5.85	1.55
Eighth	2980	1045	4025	74.04	6.03	1.40
Ninth	3627	1314	4941	73.41	5.45	1.21
Tenth	5164	2729	7894	65.42	5.92	0.98
Overall	2484	872	3356	74.01	6.31	1.77
B.Hill						
First	863	293	1155	74.66	6.71	2.25
Second	1304	406	1710	76.24	6.63	2.09
Third	1540	521	2061	74.71	6.58	2.09
Fourth	1791	585	2377	75.37	6.66	2.02
Fifth	2037	686	2724	74.81	6.42	1.84
Sixth	2239	839	3079	72.73	6.68	1.90
Seventh	2615	891	3506	74.58	5.89	1.55
Eighth	2941	1121	4062	72.41	6.02	1.45
Ninth	3508	1425	4933	71.11	5.76	1.32
Tenth	4847	2684	7531	64.36	5.29	0.96
Overall	2367	945	3314	71.47	6.23	1.72
C.Mountain						
First	1038	290	1329	78.17	5.87	2.04
Second	1483	402	1885	78.69	6.15	2.03
Third	1710	485	2195	77.90	6.66	2.07
Fourth	1965	520	2485	79.06	6.00	1.88
Fifth	2121	661	2782	76.25	6.20	1.95
Sixth	2446	731	3177	76.99	5.87	1.82
Seventh	2786	799	3585	77.72	5.61	1.53
Eighth	3040	1064	4105	74.07	5.95	1.43
Ninth	3537	1321	4858	72.80	5.53	1.20
Tenth	4846	2581	7427	65.25	4.83	0.97
Overall	2500	887	3387	73.81	5.83	1.66

Source: Calculated from NRCS'92 for MIMAP

[9] Proportion of consumption expenditure on food.

The estimates of food ratio vary quite considerably over the decile groups in each region. It varies from 79.21 to 65.42 per cent in the terai, 76.24 to 64.36 per cent in the hills and 79.06 to 65.25 per cent in the mountains. The lower consumption expenditure groups tend to have high level of food ratio and the higher expenditure group tend to have low level of food ratio in each region. These results are confirmed by the correlation coefficients between the food ratio and the per capita consumption expenditure (-0.97 in terai, -0.94 in hill and -0.95 in mountain).

The estimates of food ratio tend to decrease with the decrease in the average household size over the decile groups in each region. The correlation coefficients of food ratio and average household size of decile group are 0.56, 0.82 and 0.79 in the terai, hill and mountain regions, respectively. The estimates also tend to decrease with the decrease in the average number of children per household in each region. The correlation coefficients of food ratio and average household children of decile group are 0.80, 0.85 and 0.87 in the terai, hill and mountain regions, respectively.

4.4.2 Housing

Approximately 94 percent of all families, irrespective of income status, own their dwellings. Even in the urban Kathmandu Valley, owner-occupancy rate is 66 percent. (Illegal home construction in urban areas, however, is high at 27 percent). The average dwelling is approximately 876 sq.ft. in size, with the urban dwelling smaller by about 100 sq. ft. Average per capita dwelling space is about 155 sq. ft. However, homesteads in Tarai are 3.7 times and 2.3 times as large as those in the Mountain region and Hills respectively. Both the homesteads and dwellings of the poor are smaller in size, by about one-third, compared to those of the non-poor (CBS 1997a).

While the ownership and distribution of housing presents a satisfactory picture, the same cannot be said of the physical quality of housing and, thus, of well being. The walls of slightly more than one-half of all housing structures are built with bricks or stones - with mud used as mortar in most of the cases. Cement-bonded brick or stone houses form only 11 percent of all houses and most of these are located in urban areas. Nearly 40 percent of the houses are constructed with bamboo strips and plastered with mud. Another 5 percent are made of wooden planks. One-half of all houses are roofed with straw, thatch, or grass. Furthermore, 90 percent of all dwellings have an earthen floor. A much larger proportion of houses in urban areas, however, has more impervious roofs and floors. Overall, based on the materials used in walls, roofs and floors, 54 percent of all houses were assessed to be substandard (CBS 1997a).

Drinking water and electricity. Only one-third of all households has access to piped water facility. Slightly more than one-third obtain drinking water from tube wells or covered wells. The rest uses open wells and open reservoirs and streams as sources of drinking water. Access tapped water is available to 58 percent of urban households while only 31 percent of the rural households enjoy this facility. Access to electricity is even more limited: only 14 percent of all households and just 9 percent of all rural households have access to electricity (CBS 1997a).

Sanitation and health: The kitchen, which is heavily smoky during the cooking hours (and, in the colder mountain regions, at almost all hours) and which otherwise needs to be kept clean, is not allocated a separate room in 42 percent of all households. The proportion of such households is 67 percent and 51 percent in the mountain and hill regions respectively. Almost 94 percent of all households use wood, dung and leaves as cooking fuels. Only 22 percent of all households use sanitary toilets. Covered drainage facilities are available only in parts of the urban areas and cater to 34 percent of the households in such areas (CBS 1997a).

4.5 Household Saving and Investment

The Rural Credit Survey conducted in 1992 by the Nepal Rastra Bank reports an average saving of just 7 percent of household income (NRB 1994). The saving propensity is directly related to level of income, which in turn is determined by the size of landholding. That survey reveals that households with large landholders save as much as 15 percent of their income while the marginal farmers dissave at an average rate of one percent of their income. Interestingly, the land-less households are found to have a high propensity to save, and in 60 percent of the districts surveyed, such households are found as savers. As the land-less households include the rural business class, semi-skilled labor and non-agricultural wage earners their income levels and hence saving rates are higher than those of the marginal landowners.

The structure of investment shows that 17 percent of household income is spent as gross capital expenditure on physical assets, of which average investment on financial assets is just 5 percent of the income. Investment on physical assets is as high as 20.5 percent of the income for large landholders, compared with 11.8 percent for medium landholders. Larger the landholding size, higher the proportion of income invested on financial assets as bank deposits, securities and shares. Large landholders invest as much as 8.5 percent of their income on financial assets compared with just 3.5 percent for small landholders. Large landholding households also invest a higher proportion of their income on land improvement and construction. The proportion of income spent for this purpose is 7 percent for large holders and 2.7 percent for marginal holders.

4.6 Indebtedness

The latest source of information on indebtedness at the household level is Rural Credit Survey (NRB 1994). According to this survey, 58 percent of the rural households were indebted in 1992. The proportion of indebtedness was higher for the medium and small landholding households compared with the large and landless households. Among the indebted households, average debt per household stood at Rs 9,987 in mid-July 1992. Of this, institutional debt stood at 30 percent, the rest was non-institutional or informal market debt. More than two-thirds of the borrowing households borrowed for consumption purposes. Eighty-seven percent of the consumption credit was financed from the informal sector borrowing compared to just 13 percent of institutional borrowing for consumption purposes. The average interest rate on borrowing was as high as 31 percent. It is obvious that borrowing for consumption and high interest cost has contributed households. As a consequence, the amount of debt for the indebted households grew by 4.3 percent from 1970 through 1992. The share of institutional debt in total household debt increased from 17 percent in 1970 to 30.4 percent in 1992. The expansion of banking services along with the extension of specialized credit programs in the rural areas has expanded access for institutional borrowing. In particular, extension of the Priority Sector Credit Program and Small Farmers Development Program has contributed to an increased flow of institutional credit in the rural areas.

4.7 Measurement of Poverty

The mainstream approach to identifying poverty has been to specify a cut-off `poverty line', defined as the level of income below which people are diagnosed as absolutely poor. Initially, the poverty line was defined on consumption space, based on normative nutritional daily per capita requirements and other non-food basic consumption requirements. The conventional measure of poverty counts the number of people below below the poverty line - the so-called "head count index", defined as the proportion of total population that happens to be below the poverty line. However, the issue of how consumption information at the household level could be translated into consumption of individuals has not been resolved. Correcting for household composition takes us into the still controversial areas of estimating adult equivalent scales. But even if this problem is solved, translated of household consumption into individual level consumption by simply dividing total consumption by the number of equivalent adults assumes that consumption within household is distributed according to need, thus ignoring the problem of inter-household distribution of poverty and its effects.

The major drawback of the head count method is that it measures neither intensity of poverty nor distribution of income among the poor. The so-called `income gap', which measures the additional income that would be needed to bring all the poor up to the level of poverty line, i.e., the minimum extra income that would be sufficient to wipe out poverty, is used to address this lacuna. But the income-gap ratio is completely insensitive to the number of heads counted and it takes note only of the average gap of income of the poor from the poverty line. The major weakness of both of these indices is that they do not take into account income distribution among the poor.

4.7.1 Poverty incidence trends

The main data sources for poverty are: NPC (1977), NPC (1985), NRB (1988) and World Bank/UNDP (1990), NRB (1994) and NLSS (1996). In 1977, the National Planning Commission (NPC 1977) defined the poor as individuals with income/consumption levels below the physiologically required level. NPC has also defined poverty in terms of basic needs (NPC 1985). However, no attempt has been made to measure poverty in terms of "deprivation of material requirements for minimally acceptable fulfillment of human needs" (UNDP 1997:6). NESAC (1998) has follwed the definition of poverty line adopted by NPC (1977), NRB (1988) and World Bank/UNDP (1990), which is expressed in terms of consumption required to maintain a family in "good nutritional health" as well as to satisfy "minimum conventional needs". It has been argued that consumption is a more appropriate variable than the level of living because utility depends directly on consumption and not on income per se. Current consumption is a better indicator of the both current standard of living and long-term average well being. Thus, we have chosen consumption expenditure rather than income to assess the level of living. Our analysis of the trends in incidence of poverty in Nepal is constrained by limitations set by various surveys and is restricted to the normative criteria of the minimum consumption bundle of food items related to the bare physiological needs of survival.

In 1985, the national incidence of poverty was 42.6 percent (NRB 1988). However, there was significant variation across the ecological regions. Incidence of poverty was highest in the Hills (47 percent of households and 50 percent of the population), followed by the Mountains (36 percent of households and 44 percent of the population), and Tarai (33 percent of households and 35 percent of the population).

The survey also revealed that incidence of poverty was more pronounced in the rural than in urban areas. In the rural areas, it was 40.7 percent of the households, which is 41.3 percent in terms of the total population. Within rural areas, geographical variations in the extent of poverty were found wide and distinct. In terms of both households (49.8 percent) and population, (52.9 percent), Hills showed a higher incidence of poverty than Tarai. In Tarai, 34.1 percent of households (comprising 35.4 percent total population) were found to be under the poverty line. In urban areas of the Hills, 12.6 percent of households (14.5 percent of the total population) were found poor. Moreover, the incidence of poverty was higher in urban Tarai than in urban Hills.

The World Bank/.UNDP(1990) has calculated the proportion of population below the poverty line under three sets of assumptions. The first was the poverty line defined by the NPC based on level of income required to supply the minimum caloric requirements (2,250 kcals), at 1988/89 prices. This amounted to Rs. 210 per person per month in the Hills and Rs. 197 in Tarai. It suggested that about 40 percent of population were absolutely poor. The second poverty line was defined in terms of the internationally accepted threshold of US dollar 150 per capita per annum. The proportion of population with an income level below this poverty line was estimated at 71 percent nationwide and at 75 percent in the Hills. The third approach defined the poor as suggested by Michael Lipton, i.e., as those who expenditure on food consumption absorbs 70 percent or more of total expenditure (Lipton 1983). This suggested that two-thirds of the population were below the poverty line, comprising 68 percent in the rural areas and 51 percent in urban areas, and 58 percent in Tarai and 64 percent in Hills. Another study (Chhetri 1996), based on 1992 data, evaluated household levels of income and expenditure based on the prevailing prices without adjusting for the inter-district variations. This estimates the incidence of poverty at 34 percent in Tarai and 64 percent in the Hills and Mountains. The study indicated no significant difference in the incidence of poverty measured in terms of either per capita income, or consumption expenditure, or in terms of food expenditure.

Poverty estimates based on an identical level of daily per capita minimum caloric requirement of 2,250 kcals show that there is no evidence to substantiate that the incidence of poverty has declined over time. Conversely, there are indications that the absolute number of the poor has increased over the two decades since 1977. Poverty thus has increased at an annual rate of more than three percent and the number of absolute poor has almost doubled in the past 20 years.

The variation in incidence of poverty across regions is worsening over time. In 1997, the incidence of poverty in the rural areas was 2.2 times higher compared to urban areas. This ratio has gone up to 2.6 in 1996, implying that the receptive to the national average over time. The ratios of regional incidence of poverty to the national average indicate that poverty to the national average indicate that poverty is consistently more severe in the hills and Mountains compared to Tarai. In 1996, the incidence of poverty in the Mountains had gone up significantly in relation to that in Tarai, whereas it had declined in Hills.

On the basis of the Eighth Five-year Plan (1992-97), APROSC and JMA (1995) defined poverty lines in terms of per capita income for the *terai*, hill and mountain regions. The incidence of poverty was estimated to be 34 percent in the *terai* and 64 percent in the hills and mountains. Using this information, poverty lines are derived for each of the *terai*, hill and mountain regions in terms of (a) per capita income, (b) per capita consumption expenditure, (c) per capita food expenditure, and (d) per capita land holding (Table 4.8).

Table 4.8: Estimates of Poverty Lines with Respect to Four Poverty Indicators

	Poverty Definition			
Region	Per capita income* (in Rs)	Per capita consumption expenditure** (in Rs)	Per capita food expenditure** (in Rs)	Per capita operational land holding** (in ha)
Terai	2584	2332	1794	0.0783
Hills	3945	3454	2531	0.1588
Mountain	3925	3531	2644	0.1567

*Sources: * APP Estimates and ** Calculated from NRCS 92 for MIMAP*

As indicated by the NLSS (CBS 1996), around 9 million Nepalese - 45 percent of the population - are defined as poor, an increase of nearly 9 percentage points from the level of 1977. In 1977, the proportion of households falling below the poverty line was estimated at 33.7 percent (34.3 percent rural and 19.9 percent urban). However, the incidence of poverty based on income levels indicates that 40.3 percent of the households (42.2 percent of rural and 22.1 percent of urban households) fall below the poverty line. In terms of the total population, the absolute incidence of poverty (based on subsistence consumption) is estimated as 31.5 percent (32.1 percent of rural and 20.0 percent of urban population). Alternatively, in terms of subsistence income, 36.2 percent of the total population (37.2 percent rural and 17.0 percent urban) is estimated to be poor.

4.7.2 Poverty among Farm Households

Identification of the poor using readily measurable criteria is essential. Though the definition of poverty lines on the basis of income and consumption expenditure is objective, it is probably more practical to use land holding as the basis for identifying the poor owing to the overwhelmingly agrarian character of the rural households. Household income and consumption expenditure according to farm size group is analyzed. Households are classified into landless and marginal, small, and medium/large according to the land holding size. The size classes are defined as having farm land in the range of 0-0.5, 0.5-2.0 and 2.0 or more hectares, respectively. The incidence of poverty using the income criterion is calculated for each size class and for each region (Table 4.9).

Table 4.9: Distribution of the Poor and Non-poor Farm Households by Farm Categories of Three Regions

	Landless/ Marginal	Small	Medium/Large	Total
A. *Terai* region				
Poor	476 (40 %)	320 (30%)	97 (18 %)	893 (32 %)
Non-poor	723 (60 %)	759 (70 %)	441 (82 %)	1923 (68 %)
B. Hill region				
Poor	877 (70 %)	1138 (60 %)	162 (43 %)	2177 (62 %)
Non-poor	371 (30 %)	766 (40 %)	211 (57 %)	1348 (38 %)
C. Mountain region				
Poor	296 (77 %)	300 (58 %)	24 (24 %)	620 (62 %)
Non-poor	87 (23 %)	214 (42 %)	74 (76 %)	375 (38 %)

Source: Calculated from NRCS 92 for MIMAP
Note: Figures in parentheses are percentage.

Clearly, poverty is not limited to the landless/marginal and small landholders only. Forty three percent of the medium and large holders of the hills, 24 per cent of the mountain and 18 percent of the *terai* are below the poverty line, while sixty percent of the small holders of the hills, 58 percent of the mountain and 30 percent of the *terai* are below the poverty line. It is not the size of holding but return from it that helps households to escape from poverty. Calculation of the average land productivity among the poor and non-poor groups by land size class corroborates this (Table 4.10). The land productivity corresponding to the non-poor group is almost twice as high as the corresponding land productivity of the poor groups in each region.

Table 4.10: Average Land Productivity by Poor and Non-poor Groups of Households and Farm Category

(Average land productivity in Rs per hectare)

	Small	Medium/Large
A. *Terai* region		
Poor	8014	4824
Non-poor	15786	10654
B. Hill region		
Poor	11161	6046
Non-poor	21115	11929
C. Mountain region		
Poor	11199	5811
Non-poor	26058	10864

Source: Calculated from NRCS 92 for MIMAP

Irrespective of farm size, the more access households have to non-farm income the less probable it is to have the incidence of poverty. Decomposition of income by farm and non-farm sources is performed and the result is presented in Table 4.11. Consistently for all farm size groups and for all regions, the poor derive a higher proportion of income from agriculture. Alternatively, non-farm sources feature predominantly in the income of the non-poor.

Table 4.11: Percentage Share of Agricultural Income in Total Income of Poor and Non-poor Households by Farm Category and Region

	Landless/ Marginal	Small	Medium/Large
A. Terai region			
Poor	21.6	63.1	80.2
Non-poor	18.8	59.0	75.0
B. Hill region			
Poor	41.6	65.0	73.8
Non-poor	32.3	53.4	58.4
C. Mountain region			
Poor	49.1	64.3	78.9
Non-poor	43.8	61.1	53.4

Source: Calculated from NRCS 92 for MIMAP.

The contribution of non-farm income to help households to cross the poverty line is more obvious when the actual non-farm income is compared between the poor and non-poor households among the landless and marginal landholders (Table 4.12). The per capita non-agricultural income of the non-poor is nearly three times higher than that of the poor in the *terai* and mountains and nearly four times higher in the hill region. Clearly, for the landless and marginal land holders, non-farm income opportunities are detrimental; and for other landholders (small, medium and large), enhanced productivity is vital to help cross the poverty line.

Table 4.12: Per Capita Non-agricultural Income of Poor and Non-poor Landless/Marginal Holders

(Per capita non-agricultural income in Rs)

	Landless/ Marginal
A. Terai region	
Poor	1404
Non-poor	3879
B. Hill region	
Poor	1245
Non-poor	5298
C. Mountain region	
Poor	1075
Non-poor	3339

Source: Calculated from NRCS 92 for MIMAP.

Decomposition of non-farm income into wage and salary, and other sources reveals that the landless and marginal holders derive as much as three-fourths of non-farm income from wages and salaries (Table 4.13). The availability of wage work thus is a crucial determinant of non-farm income and hence incidence of poverty. Wage work opportunities (farm and non-farm) bear the torch of poverty alleviation among the landless and marginal holders. Sluggish growth especially in agriculture is inimical to wage employment creation and hence to poverty alleviation drive.

Table 4.13: Percentage Share of Income from Wage/salary in Total Non-agricultural Income Among Poor Landless/Marginal Farm Households

	Terai	Hill	Mountain
Share of income from wage/salary	75.2	68.0	71.0

Source: Calculated from NRCS 92 for MIMAP.

4.8 Characteristics of the Poor and Non-poor

After identifying the poor households in terms of income, an attempt is made to characterize these households in terms of major demographic and other economic indicators (Table 4.14). In general, poor households are large in size and have higher numbers of children and the majority of household members are illiterate. These households consume more than their income and spend almost three-fourths of consumption expenditure on food. The imbalance in income and consumption is probably met through dissaving causing a gradual depletion of capital. This trend is dangerous as it deepens poverty making the poor households poorer over time.

The difference in the basic characteristics of the poor and non-poor households is obvious in the table. Poor households in general have larger household size, greater number of children and almost double the incidence of illiteracy compared to the non-poor households. In terms of resource endowment and economic status, per capita total consumption and food consumption of the non-poor is almost double of that of the poor, and the non-poor have almost twice the per capita land size and more than three times the per capita income compared to the poor.

Table 4.14: Characterizing Poor and Non-poor Households by Region

	Terai		Hills		Mountain	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Average household size (number)	6.76	6.10	6.45	5.86	5.98	5.56
Child Per Household (number)	2.25	1.54	1.94	1.35	1.97	1.33
Illiterate per Household (number)	5.21	3.55	4.21	2.72	4.42	3.02
Literate females per 100 literate males	31	45	40	50	27	49
Average age of household head (yrs)	42.26	44.14	45.47	47.96	42.64	44.32
Income Per Capita (Rs)	1811	5376	2361	7467	2349	8206
Share of non-agri income (%)	52.2	44.95	40.9	49.69	40.6	43.07
Per Capita Consumption (Rs)	2064	4021	2459	4799	2560	4864
Food Expenditure per capita (Rs)	1622	2928	1834	3320	1984	3418
Food Ratio (%)	75.6	72.80	74.0	69.18	17.5	70.27
Land per Household (ha.)	0.8094	1.4038	0.8522	1.2073	0.6950	1.3917
Land Per Capita (ha.)	0.1197	0.2301	0.1320	0.2059	0.1162	0.2502
Share of owned Land (%)	77.6	79.25	93.6	94.49	87.5	89.03

Source: Calculated from NRCS 92 for MIMAP.

4.8.1 Correlates of poverty

Relative incidence of poverty in rural areas is 2.6 times higher than in urban areas. Poverty is less severe in the eastern and central development regions compared to other development regions. Similarly, poverty is less rampant in Tarai compared to other economic regions. Incidence of poverty is most in the mid-western and far western Mountains, follows by the eastern and far western Hills. It is relatively less severe in eastern Tarai, and central Hills and central Tarai.

Contrary to the general belief, the situation of deprivation is better among the female-headed households. This is likely to be a result of defective reporting and data collection procedure. It may be that women receiving remittances from migrant husbands were over-represented in the sample. The age of the household head seems to affect poverty significantly. Incidence of poverty is higher among households with the age of their heads from 25 to 40 years. It is likely to be due to the high rate of depends per households in this category.

Educational attainment is a valuable safety-value to neutralize burden of poverty. Thus, the illiterate is much more prone to be poor. However, data show that the achieved level of education does not necessarily reduce the severity of poverty proportionately, particularly at the low levels of education. Incidence of poverty is higher among households whose heads have completed primary level education than among those whose heads are simply literate and had not attended school.

In terms of occupation, households made up of agricultural and production workers are found to be more prone to poverty. In particular, agricultural wage employees are likely to be poor. Administrative workers, in contrast, are non-poor. Similarly, salaried workers in the sample have a low incidence of poverty.

CHAPTER V
SOCIAL ACCOUNTING MATRIX FOR NEPAL

The SAM provides a consistent accounting of the circular flow of incomes and expenditures in an economy for a particular year. Transactions in the economy are represented in matrix form. By convention, entries in any row of the SAM represent revenue sources, and entries in any column represent payments. Thus each cell in a Table reports a payment from a column account to a row account. Each account balances, with incomes exactly equaling expenditures such that the column sums in a SAM equal the corresponding row sums.

There are six main accounts in a SAM: Factors, Institutions, Rest of the World, Activities, Commodities and Accumulation. Each account can then be further desegregated to reflect the socio-economic structure of the economy being considered and particular policy modeling needs. The Factor account is divided into three primary factors: unskilled labour, skilled labour and capital. Institutions account is divided further among Households (non-poor and poor), Firms and Government. Activities account comprises of 15 branches of production sectors. The Commodities account is separated between domestic and export markets. Commodities account consists of 14 major groups similar to the activities, but government services has been dropped as there is absence of the market for government services. Similarly, Export market consists of 14 sectors. The Accumulation account includes private and public investment.

Distinction between "activities" and "commodities" have been made in the SAM. The account of "activities" corresponds to the producing sectors in the input-output accounts. The "commodity" accounts combine domestic supply with imports to yield total supply to the domestic market, or absorption. The separation of the "activity" and "commodity" accounts is important in the modeling framework because activities are assumed to consist of producers who are behaviorally distinct in the models. The "commodity" account corresponds to the domestic market for all products, with supplies coming from producers and imports. Note that exports are not included in the "commodity" accounts but are sold directly to the "rest of the world" by producers ("activities"). Thus exports and imports are not treated symmetrically. Furthermore, the distinction between Activities and Commodities allows more than one activity sector to produce a given commodity. This can be useful if there are two different technologies for producing the same good. The schematic SAM is described in Table 2.1.

Table 5.1: Schematic Social Accounting Matrices

Receipts	Expenditure									
	Factors	Househ-olds	Firms	Government	Rest of the World	Activities	Domestic Market	Export Market	Accumulation	Total
Factors						Value Added				GNP at Factor Cost
Households	Allocation of Income		Transfers	Government Transfer	Remittance and factor income					Has Income
Firms	Non-distributed Profit	Transfers	Transfers		Transfer from abroad					Firm Income
Government	Taxes on Factors		Taxes		Foreign Aid and other transfers to government	Indirect Taxes	Import Tariffs	Export Duties		Govt. Income
Rest of the World	Expatriation of Profits	Payments to citizen abroad	Current transfers abroad	Repayment of Government debt						Imports
Activities							Domestic Sale	Export Sale		Production
Domestic Market		Private Consumption		Government Consumption		Intermediate Inputs			Private and Public Investments	Domestic Demand
Export Market					Exports					Export Demand
Accumulation	Retained Earnings	Household Saving	Firm Savings	Government Saving	Current A/C deficit					Total Saving
Total	Factor outlay	Household Expenditure	Firm Expenditure	Government Expenditure	Foreign Exchange Earning	Production	Domestic Supply	Export Earning	Total Investment	

Table 5.2: Accounts for the Desegregated Nepal SAM

Factors	Households	Firm	Government	ROW	Activities	Commodities Domestic Market	Export Market	Accumulation
Skilled Labour	Non-poor HHs	Firm	Government	ROW	Paddy (PAD)	Paddy	Paddy	Private Investment
Unskilled labour	Poor HHs				Other food crops (OFC)	Other food crops	Other food crops	Public Investment
Capital					Cashcrops (CCR)	Cashcrops	Cashcrops	
					Livestock & Fishing (CCR)	Livestock & Fishing	Livestock & Fishing	
					Forestry (FRY)	Forestry	Forestry	
					Mining and quarring (MNQ)	Mining and quarrying	Mining and quarrying	
					Manufacturing (MFG)	Manufacturing	Manufacturing	
					Construction (CON)	Construction	Construction	
					Gas, Electricity & water (GEW)	Gas, Electricity & water	Gas, Electricity & water	
					Hotel and Restaurants (HTR)	Hotel and Restaurants	Hotel and Restaurants	
					Transport & Communication (TCM)	Transport & Communication	Transport & Communication	
					Whole sale and Retail Trade (WRT)	Whole sale and Retail Trade	Whole sale and Retail Trade	
					Business, Real Estate and Dwelling (BRD)	Business, Real Estate and Dwelling	Business, Real Estate and Dwelling	
					Government Services (GSE)	Other Services	Other Services	
					Other Services (OSE)			

Table 5.3: Social Accounting Matrices of Nepal, 1986/87

SN.	FACTORS	FACTORS					AGENTS		
		1	1a	2	3a	3b	4	5	6
1	LABOUR NON-SKILLED								
1a	LABOUR SKILLED								
2	CAPITAL								
	AGENTS								
3a	HOUSEHOLD1	1996	3267	20573	0		100	49	245
3b	HOUSEHOLD2	16808	4241	5142			6	124	1137
4	FIRMS			3420			0	1038	150
5	GOVT.				1438	358	572	0	1420
6	REST OF WORLD							445	0
	BRANCHES								
7.1	PADDY								
7.2	OTHER FOOD CROPS								
7.3	CASH CROPS								
7.4	LIVESTOCK AND FISHERIES								
7.5	FORESTRY								
8	MINING AND QUARRYING								
9	MANUFACTURING								
10	CONSTRUCTION								
11	GAS,ELECTRICITY AND WATER								
12	HOTEL AND RESTAURANT								
13	TRANSPORTATION AND COMMUNICATION								
14	WHOLESALE AND RETAIL TRADE								
15	BANKING,REALESTATE AND DWELLING								
16	GOVERNMENT SERVICES								
17	OTHER SERVICES								
	DOM. GOODS								
18.1	PADDY				5640	3741			
18.2	OTHER FOOD CROPS				2794	4417			
18.3	CASH CROPS				3001	3892			
18.4	LIVESTOCK AND FISHERIES				4000	1974			
18.5	FORESTRY				1000	2554			
19	MINING AND QUARRYING				67	45			
20	MANUFACTURING				5933	3987			
21	CONSTRUCTION				0	0			
22	GAS,ELECTRICITY AND WATER				405	274			
23	HOTEL AND RESTAURANT				8	5			
24	TRANSPORTATION AND COMMUNICATION				34	22			
25	WHOLESALE AND RETAIL TRADE				61	40			
26	BANKING,REALESTATE AND DWELLING				1117	744			
27	GOVERNMENT SERVICES				5	3		6570	
28	OTHER SERVICES				187	124			
29	NON-COMPETING IMPORTS								
	EXPORT GOODS								
30.1	PADDY								9
30.2	OTHER FOOD CROPS								13
30.3	CASH CROPS								298
30.4	LIVESTOCK AND FISHERIES								178
30.5	FORESTRY								5
31	MINING AND QUARRYING								0
32	MANUFACTURING								2153
33	CONSTRUCTION								0
34	GAS,ELECTRICITY AND WATER								0
35	HOTEL AND RESTAURANT								1224
36	TRANSPORTATION AND COMMUNICATION								2690
37	WHOLESALE AND RETAIL TRADE								928
38	BANKING,REALESTATE AND DWELLING								0
39	GOVERNMENT SERVICES								0
40	OTHER SERVICES								19
	ACCUMULATION								
41a	PRIVATE				540	5278	1644	0	0
41b	PUBLIC				0	0	2286	-529	3229
42	TOTAL	18804	7508	29135	26230	27458	4608	7697	13698

Table 5.3: Social Accounting Matrices of Nepal, 1986/87

(Contd..)

SN.	FACTORS	Branches 7.1	7.2	7.3	7.4	7.5	8	9	10	11	12	13	14	15	16	17
1	LABOUR NON-SKILLED	3207	2611	2169	4362	898	33	603	1810	91	194	979	129	1330	0	388
1a	LABOUR SKILLED	250	250	228	200	100	2	259	201	44	49	600	86	730	4209	300
2	CAPITAL	4096	1797	3806	4562	1911	65	2294	3029	279	424	2015	2023	2655	0	179
	AGENTS															
3a	HOUSEHOLD1															
3b	HOUSEHOLD2															
4	FIRMS															
5	GOVT.	212	273	248	101	111	1	1469	85	11	100	-2	2	31	0	5
6	REST OF WORLD															
	BRANCHES															
7.1	PADDY															
7.2	OTHER FOOD CROPS															
7.3	CASH CROPS															
7.4	LIVESTOCK AND FISHERIES															
7.5	FORESTRY															
8	MINING AND QUARRYING															
9	MANUFACTURING															
10	CONSTRUCTION															
11	GAS,ELECTRICITY AND WATER															
12	HOTEL AND RESTAURANT															
13	TRANSPORTATION AND COMMUNICATION															
14	WHOLESALE AND RETAIL TRADE															
15	BANKING,REALESTATE AND DWELLING															
16	GOVERNMENT SERVICES															
17	OTHER SERVICES															
	DOM. GOODS															
18.1	PADDY	312	0	0	662	0	0	966	0	0	0	0	0	0	0	0
18.2	OTHER FOOD CROPS	0	330	0	244	0	0	406	0	0	0	0	0	0	0	0
18.3	CASH CROPS	0	0	304	0	0	0	1603	0	0	0	0	0	4	0	24
18.4	LIVESTOCK AND FISHERIES	1198	1326	1285	0	0	0	664	0	0	0	0	0	0	0	0
18.5	FORESTRY	0	0	0	33	566	0	38	18	0	0	0	0	2	0	0
19	MINING AND QUARRYING	0	0	0	0	0	49	256	0	0	0	0	0	0	0	0
20	MANUFACTURING	0	0	16	35	131	70	1376	980	74	87	180	75	222	713	253
21	CONSTRUCTION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	GAS,ELECTRICITY AND WATER	6	4	11	0	34	1	332	0	137	67	114	27	28	27	9
23	HOTEL AND RESTAURANT	0	0	0	0	12	2	18	0	3	23	374	15	115	223	67
24	TRANSPORTATION AND COMMUNICATION	616	453	252	279	225	11	427	39	15	68	674	621	110	345	205
25	WHOLESALE AND RETAIL TRADE	424	312	152	168	66	5	38	18	1	0	699	750	13	11	15
26	BANKING,REALESTATE AND DWELLING	378	344	349	0	87	65	134	7	578	0	1017	476	277	77	106
27	GOVERNMENT SERVICES	0	0	0	0	0	0	17	1	0	0	0	0	0	0	0
28	OTHER SERVICES	218	78	4	0	37	67	235	182	23	67	268	77	159	359	12
29	NON-COMPETING IMPORTS	392	358	44	0	38	0	2516	390	167	997	1178	7	80	632	553
	EXPORT GOODS															
30.1	PADDY															
30.2	OTHER FOOD CROPS															
30.3	CASH CROPS															
30.4	LIVESTOCK AND FISHERIES															
30.5	FORESTRY															
31	MINING AND QUARRYING															
32	MANUFACTURING															
33	CONSTRUCTION															
34	GAS,ELECTRICITY AND WATER															
35	HOTEL AND RESTAURANT															
36	TRANSPORTATION AND COMMUNICATION															
37	WHOLESALE AND RETAIL TRADE															
38	BANKING,REALESTATE AND DWELLING															
39	GOVERNMENT SERVICES															
40	OTHER SERVICES															
	ACCUMULATION															
41a	PRIVATE															
41b	PUBLIC															
42	**TOTAL**	11309	8136	8868	10646	4216	371	13651	6760	1423	2076	8096	4288	5756	6596	2116

Table 5.3: Social Accounting Matrices of Nepal, 1986/87

(Contd..)

SN.	FACTORS	DOM. GOODS															
		18.1	18.2	18.3	18.4	18.5	19	20	21	22	23	24	25	26	27	28	29
1	LABOUR NON-SKILLED																
1a	LABOUR SKILLED																
2	CAPITAL																
	AGENTS																
3a	HOUSEHOLD1																
3b	HOUSEHOLD2																
4	FIRMS																
5	GOVT.	3	10	19	11	0	7	549	0	8	0	50	9	0	0	0	516
6	REST OF WORLD	18	58	236	156	0	39	5003	0	45	0	655	207	0	0	0	6836
	BRANCHES																
7.1	PADDY	11300															
7.2	OTHER FOOD CROPS		8123														
7.3	CASH CROPS			8573													
7.4	LIVESTOCK AND FISHERIES				10470												
7.5	FORESTRY					4211											
8	MINING AND QUARRYING						371										
9	MANUFACTURING							11521									
10	CONSTRUCTION								6760								
11	GAS,ELECTRICITY AND WATER									1423							
12	HOTEL AND RESTAURANT										865						
13	TRANSPORTATION AND COMMUNICATION											5435					
14	WHOLESALE AND RETAIL TRADE												3370				
15	BANKING,REALESTATE AND DWELLING													5756			
16	GOVERNMENT SERVICES														6596		
17	OTHER SERVICES															2097	
	DOM. GOODS																
18.1	PADDY																
18.2	OTHER FOOD CROPS																
18.3	CASH CROPS																
18.4	LIVESTOCK AND FISHERIES																
18.5	FORESTRY																
19	MINING AND QUARRYING																
20	MANUFACTURING																
21	CONSTRUCTION																
22	GAS,ELECTRICITY AND WATER																
23	HOTEL AND RESTAURANT																
24	TRANSPORTATION AND COMMUNICATION																
25	WHOLESALE AND RETAIL TRADE																
26	BANKING,REALESTATE AND DWELLING																
27	GOVERNMENT SERVICES																
28	OTHER SERVICES																
29	NON-COMPETING IMPORTS																
	EXPORT GOODS																
30.1	PADDY																
30.2	OTHER FOOD CROPS																
30.3	CASH CROPS																
30.4	LIVESTOCK AND FISHERIES																
30.5	FORESTRY																
31	MINING AND QUARRYING																
32	MANUFACTURING																
33	CONSTRUCTION																
34	GAS,ELECTRICITY AND WATER																
35	HOTEL AND RESTAURANT																
36	TRANSPORTATION AND COMMUNICATION																
37	WHOLESALE AND RETAIL TRADE																
38	BANKING,REALESTATE AND DWELLING																
39	GOVERNMENT SERVICES																
40	OTHER SERVICES																
	ACCUMULATION																
41a	PRIVATE																
41b	PUBLIC																
42	**TOTAL**	11321	8191	8828	10637	4211	417	17073	6760	1476	865	6140	3586	5756	6596	2097	7352

Fli.

Table 5.3: Social Accounting Matrices of Nepal, 1986/87

(Contd..)

SN.	FACTORS	EXPORTS GOODS															ACCUMULATION		TOTAL
		30.1	30.2	30.3	30.4	30.5	31	31	33	34	35	36	37	38	39	40	41a	41b	42
1	LABOUR NON-SKILLED																		18804
1a	LABOUR SKILLED																		7508
2	CAPITAL																		29135
	AGENTS																		0
3a	HOUSEHOLD1																		26230
3b	HOUSEHOLD2																		27458
4	FIRMS																		4608
5	GOVT.	0	0	3	2	0		23	0	0	13	29	10	0	0	0			7697
6	REST OF WORLD																		13698
	BRANCHES																		
7.1	PADDY	9																	11309
7.2	OTHER FOOD CROPS		13																8136
7.3	CASH CROPS			295															8868
7.4	LIVESTOCK AND FISHERIES				176														10646
7.5	FORESTRY					5													4216
8	MINING AND QUARRYING																		371
9	MANUFACTURING							2130											13651
10	CONSTRUCTION								0										6760
11	GAS,ELECTRICITY AND WATER									0									1423
12	HOTEL AND RESTAURANT										1211								2076
13	TRANSPORTATION AND COMMUNICATION											2661							8096
14	WHOLESALE AND RETAIL TRADE												918						4288
15	BANKING,REALESTATE AND DWELLING													0					5756
16	GOVERNMENT SERVICES														0				6596
17	OTHER SERVICES															19			2116
	DOM. GOODS																		0
18.1	PADDY																0	0	11321
18.2	OTHER FOOD CROPS																0	0	8191
18.3	CASH CROPS																0	0	8828
18.4	LIVESTOCK AND FISHERIES																190	0	10637
18.5	FORESTRY																0	0	4211
19	MINING AND QUARRYING																0	0	417
20	MANUFACTURING																1,989	952	17073
21	CONSTRUCTION																3,834	2,926	6760
22	GAS,ELECTRICITY AND WATER																0	0	1476
23	HOTEL AND RESTAURANT																0	0	865
24	TRANSPORTATION AND COMMUNICATION																990	754	6140
25	WHOLESALE AND RETAIL TRADE																459	354	3586
26	BANKING,REALESTATE AND DWELLING																0	0	5756
27	GOVERNMENT SERVICES																0	0	6596
28	OTHER SERVICES																0	0	2097
29	NON-COMPETING IMPORTS																		7352
	EXPORT GOODS																		0
30.1	PADDY																		9
30.2	OTHER FOOD CROPS																		13
30.3	CASH CROPS																		298
30.4	LIVESTOCK AND FISHERIES																		178
30.5	FORESTRY																		5
31	MINING AND QUARRYING																		0
32	MANUFACTURING																		2153
33	CONSTRUCTION																		0
34	GAS,ELECTRICITY AND WATER																		0
35	HOTEL AND RESTAURANT																		1224
36	TRANSPORTATION AND COMMUNICATION																		2690
37	WHOLESALE AND RETAIL TRADE																		928
38	BANKING,REALESTATE AND DWELLING																		0
39	GOVERNMENT SERVICES																		0
40	OTHER SERVICES																		19
	ACCUMULATION																		0
41a	PRIVATE																		7462
41b	PUBLIC																		4986
42	TOTAL	9	13	298	178	5	0	2153	0	0	1224	2690	928	0	0	19	7462	4986	345731

CHAPTER VI

NEPALESE CGE MODEL

6.1 Policy Planning in Nepal

Multisectoral planning models and its variants were developed to assist the planner and policy makers of the country to look-after the trade-off of various policies in terms of economic benefits and costs and to provide the medium term scenario of such policies.

6.1.1 Input-output Model and SAM

The first Input-Output Table, 1986/87 for Nepal was prepared by DSC(1991) under the aegis of UNIDO , which consisted 39x39 sectors. . This was further desegregated into 43x43 sectors by NPC (1992). The input-output table prepared by NPC (1992) also needs through updates and revision because of the following reasons: 1) input-output relations are too old, as it has already been ten years old; 2) the data of cost structure of agricultural crops are inadequate and based on strong assumptions; 3) cost structure data in many sector is missing, and relies largely on judgements; and 4) estimates of services sector is based on scanty evidences.

Despite these limitations, the current SAM was prepared by MIMAP-Nepal primarily based on the information contained in the I-O Table prepared by NPC. The SAM Comprised of 15 major sectors.

6.1.2 Computable General Equilibrium Modeling (CGE)

The aim of CGE modeling is both to facilitate analyses of a wide range of economic and social policy options based on general equilibrium framework. Moreover, it attempts to provide a basis for further model development to cover explicit monetary, macro, trade and tariff issues, which are central to current Nepalese policy debates. The current CGE model is a neoclassical real side general equilibrium model. Its main features involve cost minimization by producers, utility maximization by households, perfect mobility of factors, and competitive market driving profits to zero. The model allows for detailed analysis of impacts of economic and social policy options such as impacts of tariff policy, incomes policy and anti-poverty programs to the various sectors and household groups through embedding such analyses within a general equilibrium framework. Furthermore, it also captures relative price effects, resource allocation and other economy-wide effects.

There are four types of "agents" in the economy: households, divided into non-poor and poor sub-groups, firms, the government, and the rest of the world. The model captures some of the major interactions between essential sectors of the Nepalese economy: non-poor and poor agricultural and manufacturing, importing and

exporting, and others. Its strength is its capability to trace through the economy-wide implications of any proposed policy changes. It can identify which sector may expand and which may contract; which group in the economy may gain or lose; and assess impacts on trade patterns and inter-sectoral resource transfers. Its weakness is its traditional equilibrium structure, which assumes competitive behavior; incorporates no explicit treatment of time and in its present form, contains no monetary features and has balanced government and external sector accounts.

6.2 Nepalese Core CGE Model Specification

The specification of model equation follows closely that in Dervis, de Melo, and Robinson (1982) and in Condon, Dahl, and Devarajan (1987). The equations are presented in the following order: production and factor demand, industry value added functions, intermediate demands, labour market, income, expenditure and saving of households and other institutions, foreign trade, price and equilibrium conditions. The detailed model specification are presented in Appendix-I.

6.2.1 Production –Factor Demand

Aggregate output of the economy is produced through the Leontief technology implying a fixed ratio between value added and intermediate demand. Value added is generated through the Cobb-Douglas technology with the use of primary factors labor and capital. Value added in the government sector is assumed to be equal to the demand of employment in the government sector. Intermediate demand is a derived Leontief technology. Intermediate consumption is derived from sectoral production levels and input-output coefficients. Demand for intermediate imports behaves as non-competitive imports in a developing country, and since Nepal belongs to this group, we have followed the same.

Table 6.1 : Share of Labour and Capital in Value Added

Sector	Labor	Capital	Intensity
Agriculture	46.4	52.6	Capital
Mining	35.0	65.0	Capital
Manufacturing	18.5	49.2	Capital
Construction	38.7	58.4	Capital
Gas, Electricity and Water	32.5	66.7	Capital
Hotel and Restaurant	31.1	54.2	Capital
Transport and Communication	42.4	54.1	Capital
Wholesale and Retail Trade	9.6	90.4	Labor
Business, Real Estate & Dwelling	43.5	56.1	Capital
Government Services	100.0	0.0	Labor
Other Services	79.2	20.6	Labor
TOTAL	45.6	50.5	

6.2.2 Treatment of the Labour Market

Labor market takes into account the dichotomy existing in the Nepalese labor market between formal and informal sectors. Labor demand for the commercial sectors is derived from the optimizing behavior of the Cobb-Douglas technology. This is determined by the relative price of value added to the wage rate and value added generated in the sectors. The labor demand for non-qualified and qualified labor are provided by the derived Cobb-Douglas technology. Labor demand for the government sector is determined by the ratio of value added to the wage rate.

6.2.3 Income and Savings

Household income consists of wage income, rental income , dividend and transfers. Firms capital income is defined as the share of non-household rental income. Dividend is assumed as a fixed rate of the firms capital income. Household saving is defined as a fixed percent of the disposable income of the household. Disposable income is derived as household income net of income taxes. Firm income consists of firms capital income, government transfers to firms evaluated at producer prices and rest of the world transfer to firms at local currency. Firm saving is derived through deducting the capital taxes, dividend and transfer to the rest of the worlds from the firm's total income. Government income comprises of taxes from households, capital tax of the firms, production taxes, transfer from rest of the world to government, import tariff and export duty. Indirect taxes is equal to the tax revenue generated from total output at producer price. Import duty is equal to tariff collected at the domestic prices. Export duty is equal to export duty collected at domestic prices. Government saving is equal to government income less government transfer less total government consumption.

6.2.4 Demand

Total household consumption is equal to disposable income of the households less saving of the households. The household consumption function is estimated following Linear Expenditure System. Government consumption is defined as the volume of regular expenditure that the government sector incurs. Total consumption of good i is a volume measure comprising of household and government consumption. Table 6.2-6.4 provide the demand structure of different time periods of the economy into three component form: final consumption demand, intermediate goods demand and investment demand.

Table 6.2 : Structure of Demand: 1986/87

Sectors	C	INTD	INV	TOTAL
Agriculture	76.4	23.2	0.4	100.0
Mining	27.0	72.8	0.2	100.0
Manufacturing	57.8	24.4	17.8	100.0
Construction	0.0	0.0	100.0	100.0
Gas, Electricity and Water	45.9	54.1	0.1	100.0
Hotel and Restaurant	1.4	98.5	0.1	100.0
Transport and Communication	0.9	71.3	27.8	100.0
Wholesale and Retail Trade	2.8	75.6	21.6	100.0
Business, Real Estate and Dwelling	32.3	67.7	0.0	100.0
Government Services	99.7	0.3	0.0	100.0
Other Services	14.8	85.1	0.0	100.0
Total	56.1	30.9	13.1	100.0

Source: Calibration file, CAL87R

Table 6.3 : Structure of Demand: 1991/92

Sectors	C	G	INTD	INV	Total
Agriculture	81.86	-	17.68	0.45	100.00
Mining	27.50	-	72.50	-	100.00
Manufacturing	55.14	-	28.59	16.27	100.00
Construction	-	-	-	100.00	100.00
Gas, Electricity and Water	50.97	-	49.03	-	100.00
Hotel and Restaurant	2.42	-	97.58	-	100.00
Transport and Communication	1.28	-	61.47	37.26	100.00
Wholesale and Retail Trade	4.21	-	64.99	30.80	100.00
Business, Real Estate and Dwelling	46.88	-	53.12	-	100.00
Government Services	0.19	99.33	0.48	-	100.00
Other Services	17.42	-	82.58	-	100.00

Source: SAM of Nepal;, 1991/92

Table 6.4 : Structure of Demand: 1996/97

	C	G	INTD	INV	Total
Agriculture	82	-	18	1	100
Mining	26	-	74	-	100
Manufacturing	52	-	30	19	100
Construction	-	-	-	100	100
Gas, Electricity and Water	38	-	62	-	100
Hotel and Restaurant	2	-	98	-	100
Transport and Communication	1	-	58	41	100
Wholesale and Retail Trade	4	-	62	34	100
Business, Real Estate and Dwelling	32	-	68	-	100
Government Services	0	99	0	-	100
Other Services	16	-	84	-	100

Source: SAM of Nepal, 1996-97

6.2.5 Consumption: Linear Expenditure System

The Stone-Geary Linear Expenditure System (LES) has been specified to estimate the consumption of various socio economic groups in the model. The LES is a complete set of consumer demand equations liner in total expenditure. The advantage of the LES is that it permits solutions of the general equilibrium system without computational iterations to determine consumer choice. For each socio-economic group, consumer demand is given by (omitting a group subscript)

$$C_i = \tau_i + \beta_i / P_i \,(Y - \Sigma_j P_j \tau_j) \text{-------------------------} (1)$$

where Y is total nominal expenditure for the group, τj are the committed expenditure or "subsistence minima" in physical terms, and βi are the marginal budget shares that determine the allocation of supernumerary income (i.e., expenditure required for purchasing the subsistence minima).

In the LES demand functions, only two parameters are required to be estimated: 1) floor consumption level and 2) marginal budget share. Once the average budget shares are obtained by dividing the consumption expenditures for sector i, PiCi, by the total consumption expenditure Y, both being given by the personal consumption expenditures , column of the Input-Output table, the above two parameters can be estimated in a variety of ways depending on the extent and quality of data. It is appropriate to econometrically estimate these parameters by using time series data for household expenditure. We have chosen to compute the parameters of LES for each group given exogenously specified average budget shares, income elasticities of demand and a parameter measuring the elasticity of marginal utility of income with respect to income (Frisch parameter, Frisch, 1959; Brown and Deaton , 1972) .

It can be shown that in the LES, the Frisch parameter is equal to the negative of the ratio of total expenditure and the super numerary expenditures, i.e., the Frisch parameter is given by:

$\phi = -Y/(Y-S)$ where $S = \sum_j P_j \tau_j$ ---------------------------------(2)

Differentiation of Equation (a) shows that the expenditure elasticities of demand (Engel elasticities) are given by

$\varepsilon i = \beta i \, Y/Pi \, Ci = \beta i/\theta$ --(2.1)

where $\theta i = PiCi/Y$, the average budget share of good i

Given the average budget shares and expenditure elasticities, the marginal budget shares are given by

$\beta i = \varepsilon i \, \theta I$---(3)

Where εi are the expenditure elasicities and θi are average budget shares. Note that the marginal budget shares must sum to one, which is equivalent to imposing the condition known as Engel aggregation, that sum of the expenditure elasticities weighted by average budget shares must equal to one.

$\sum \beta i = \sum \theta i \varepsilon i = 1$--(4)

The subsistence minima or floor consumption level τi are related to the other parameters according to the following equation:

$\tau i = (Y/Pi)(\theta i + \beta i / \phi)$---(5)

For the present study , a Frisch parameter of -5.5 for non-poor households and -5 for poor households has been assumed on the basis of comparative estimates made for countries similar in economic development and industries activities as Nepal. Furthermore, Lluch, Powell and Williams (1977) show that the absolute value of this parameter falls with increases in per capita income.

With the value of Engel elasticities, Frisch parameter and average budget shares already available, the marginal budget shares and floor consumption level are computed using equations (3)-(5). Our estimates of the average budget shares, income elasticities, and Frisch parameters are based on the literature searches. Given the parameter of LES, the own and cross price elasticities of demand can be computed from the following equations:

$\eta ii = - \varepsilon_i \; (P_i \tau_i / Y - 1/\phi)$--------------------------------------(6)

$\eta ij = - \varepsilon_i \; (P_j \tau_j / Y) \; i \neq j$ ---------------------------------------(7)

Where ηii = own-price elasticity of good i
ηij = cross-price elasticity of good i.

Given the values of Engel elasticities, Frisch parameter and floor consumption levels, the direct and cross-price elasticities are computed by equations (6) and (7), respectively.

Intermediate demand of good i is derived from the input-output relations and intermediate consumption of good i.

Investment is also a volume measure determined by the share of good i in the total volume of investment, normalized through composite price index.

6.2.6 Foreign Trade

Total output is defined as the constant elasticity of transformation for domestic and export markets. Export demand is derived from the CET and is determined by the relative price of export to domestic price index, domestic output level and degree of transformation between domestic and export markets. Composite commodity is a CES function of domestic and imported commodity. Government demand of the composite commodity is simply the government services or output. Import demand function is derived from the cost minimization of the CES.

6.2.7 Import demand and Export Supply

The standard small-country assumption in simple commodity trade model is that the world price is fixed (i.e. that the country modeled is a price-taker) and that the domestic good is a perfect substitute for the internationally traded commodity, so that the law of one price holds. Given the high level of aggregation in an economy wide model, the assumption of perfect substitutability between domestic goods and international traded goods is not reasonable for most sectors. Thus, for importable, an alternative formulation, first proposed by Armington (1969) , is used.

First a composite commodity (Q_i) is defined as a CES function of imported goods (Mi) and domestically produced commodities (D_i). This can be formulated either as a maximization or as a minimization problem.

Maximize $Q = b_i (\delta M^{-\rho} + (1-\delta) D^{-\rho})^{-1/\rho}$---------------------(1)

subject to $P_i^C \cdot Q = P^M M + P^D D$

or, (2) Minimize $P_i^C \cdot Q = P^M M + P^D D$----------------------------(2)

subject to $Q = b_i (\delta M^{-\rho} + (1-\delta) D^{-\rho})^{-1/\rho}$

Given equation (2) each consumer chooses M_i and D_i in order to minimize the cost of obtaining a unit of Qi

$$L = P^M M + P^D D + \lambda [Q - b \{\delta M^{-\rho} + (1-\delta) D^{-\rho}\}^{-1/\rho}] \text{-----------------} (3)$$

The solution to this cost minimization yields equation (4):

$$M/D = (\delta/1-\delta)^{\sigma} (P^D / P^M)^{\sigma} \text{--} (4)$$

Equation (4) expresses the ratio of imported goods to domestically produced goods as a function of relative price of imported and domestically produced goods, where $\sigma_i = 1/(1+\rho_i)$ is the "trade substitution " elasticity. The larger the value for σ_i, the greater the sensitivity of the share of imports in total supply to price changes. In the limit, with σ_i equals to infinity (i.e. imports and domestic goods are perfect substitute), P^D must equal P^M if imports and domestic production are both non-zero.

The Nepal's demand for imports is assumed to be too small to affect world prices, so the world price of imports expressed in foreign currency(P^{WM}) is fixed exogenously. The domestic price of imports is determined by $P_n^{M} = (1+tm_n)eP_n^{WM}$

Likewise, the domestic FOB price of exports (P_n^{E}) is equal to the exogenous world FOB price in US\$ (P^{WE}) converted to domestic currency , less export taxes:

$$P_n^{E} = eP_n^{WE}/(1+te)$$

Analogous to import goods, export goods and goods produced and consumed domestically may not be perfect substitute because of the relatively high level of aggregation in the model . Following Condon, Dahl and Devarajan (1987), a constant elasticity of transformation (CET) function between domestically and export markets was used. Current account balance is derived as the import (c.i.f.) plus transfer payments from the rest of the world less export (fob) less transfer from the rest of the world to households and less transfer from the rest of the world to government. The current account deficit is encountered if there is excess demand of goods and services.

6.2.8 Price

Producer Price is a weighted average of price of domestically produced and consumed commodities and domestic price of exports, with the volume weights being the ratio of local demand for domestically produced goods i to total Production and ratio of exports (fob) to total production, adjusted for the indirect taxes. Price of value added is the ratio of total output less intermediate consumption to the value added in the sector. Domestic price of imports is equal to world prices of imports evaluated at real exchange rate with the inclusive of import tariffs. Domestic Price of exports is equal to world price of exports evaluated at real exchange rate and adjusted for the export taxes. Rental rates of capital are defined as the ratio of operating surplus to the capital stock of the sector concerned. Composite Price is defined as the weighted average price of domestic and import prices, the weights being the share of domestic and imported output in the composite commodity.

Price of the non-competitive imports is equal to the tariff on non-competitive imports multiplied by the world price of non-competive imports times exchange rate. Price of the government services is the domestic prices. Producer Price Index is the weighted average domestic prices, the weights being the share of goods in the total domestic production.

6.2.9 Equilibrium Condition

In equilibrium, total investment is equal to domestic saving plus current account balance at domestic currency. Composite commodity Q is equal to consumption demand, intermediate demand and investment demand. Labor supply is equal to labor demand.

6.2.10 Model Closure

All the model specifications are neoclassical except labour market, where equilibrium is attained at less than full employment. Therefore, labour market follows Keynesian closure.

6.3 Implementing the Modelling Approach

We use the counterfactual equilibrium analysis procedure described in Mansur and Whalley (1984) to implement the modelling approach set out above. This approach involves three steps: the construction of base data (a SAM), the calibration of model parameters to the base data, and computation of counterfactual equilibria for the policy or other changes to be analyzed.

Most CGE models are parameterized by a standard calibration procedure in which it is assumed that the underlying equilibrium conditions are satisfied (Manus and Whalley, 1984). Our approach to model estimation is a combination of econometric estimation and deterministic model calibration, which involves first compiling a consistent data set such as Social Accounting Matrix for Nepal, 1986, from which we derive parameters and exogenous variables reflecting Nepalese institutional characteristics, technical relations, factor endowment s and external conditions; secondly, obtaining econometric estimates for key model parameters, namely those of the production functions, household demand systems, export demand functions and import demand functions; thirdly, calibrating these econometrically estimated functions to the consistent data set such as 1986 Social Accounting Matrix so that they become compatible with each other. We choose year 1986 as the base year for model estimation.

The equilibrium of the system requires that, first, the excess demands for labour and for capital are both zero in factor markets; second, the excess demand for foreign exchange is zero in the foreign exchange market; and third, the excess demands for domestic commodities are all zero in product markets. When the economy is in equilibrium, the following conditions hold: (1) the marginal rate of substitution between labour and capital is equal across sectors to the ratio of factor prices; (2) the marginal rate of substitution between any pair of composite commodities is equal to the ratio of composite commodity prices for both type of households; (3) the marginal rate of substitution between imported and domestically produced commodities is equal to their price ratio for each composite commodity; and (4) for any pair of commodities, the marginal rate of transformation in production is equal to the marginal rate of substitution in consumption.

6.3.1 Base Year Data and Calibration of Model Parameters

The base period data used for the model are contained in SAM. The SAM as constructed also satisfies the various equilibrium conditions implied by the model structure we use. Aggregate supply of each good equals aggregate demand. Aggregate supply includes both domestic production and imports, while aggregate demand includes both intermediate and final demands. Final demands include private consumption expenditures, government expenditures, capital formation and exports. In addition, industry earn nominal economic profits; i.e. total receipts from sales equal total expenditures; total sales include payments for intermediate demands, final demands, and net trades; total cost of production include cost of intermediate input, payments to primary factors and taxes. Taxes paid by the production sector include the production value added-tax, import tariffs and export duties.

The base period equilibrium data set must be micro-consistent and satisfy all equilibrium condition and properties of the model given in equations (1) to (47): market clearance for all goods and factors; all fifteen sectors earn zero profits; budget balance holds for all household groups; and government budget balance. The SAM once constructed thus provides a base-period equilibrium data set, which can be used in the numerical implementation of the general equilibrium model described above, since calibration of the model to the data in the SAM involves base data consistent with the equilibrium structure of the model.

6.3.2 Calibration of Parameter Values

Calibration of the CGE model to the SAM requires the determination of parameter values for the various behavioral functions in the model such that the model reproduces the benchmark data set as equilibrium solution.

Calibration of Cobb-Douglas functions is relatively straight forward. Elasticities in the Cobb-Douglas function can be determined simply from the input share of the factors. However, the procedure used to determine the share and other parameters in the CES and CET functions through calibration are more complex, and needs values for elasticities of substitution and elasticity of transformation, respectively either from econometric studies or from literature search. The substitution parameters ((σ_i) used in the aggregation of imported and domestic goods determine imports demand elasticities given the share of domestically produced goods in total consumption. Similarly, the transformation parameters (Ψi) used in the aggregation of exported and domestic goods determine export supply elasticities given the share of domestic sales in total sales of domestically produced goods. A high value of σi or Ψi indicates goods are close substitutes. The values of various parameters used for the calibration are provided in the Tables 6.5 to 6.9.

Table 6.5: Parameters of Linear Expenditure System in Consumption

Sectors	Income Elasticities		Average Budget Share		Marginal Budget Share		Floor Consumption Level	
	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor
Paddy	1.05	0.95	0.227	0.138	0.244	0.222	4477	2973
Other Food Crops	0.8	0.4	0.113	0.163	0.092	0.11	2305	3923
Cash Crops	0.6	0.4	0.121	0.144	0.074	0.097	2593	3472
Livestock and Fisheries	1.03	0.8	0.161	0.073	0.169	0.099	3216	1641
Forestry	0.95	0.44	0.04	0.094	0.039	0.07	805	2268
Mining and Quarrying	0.92	0.43	0.003	0.002	0.003	0.001	55	40
Manufacturing	1.19	1.2	0.239	0.147	0.29	0.299	4100	2672
Construction	1.19	1.2						
Gas, Electricity & Water	1.19	1.2	0.016	0.01	0.02	0.021	313	206
Hotel & Restaurants	1.19	1.38	0.0003	0.0001	0.0004	0.0004	6	3
Transport & Communication	1.19	1.38	0.001	0.0008	0.002	0.002	26	16
Wholesale & Retail Trade	1.19	1.38	0.002	0.001	0.003	0.003	48	29
Business, Real Estate & Dwelling	1.19	1.38	0.045	0.027	0.055	0.064	871	536
Government Services	1.19	1.12	0.0002	0.0001	0.0002	0.0002	4	2
Other Services	1.19	1.38	0.008	0.005	0.009	0.01	146	90

Note: Frisch parameter : H1=--5.5, H2= -5.0

Table 6.6: Indirect Taxes and Tariff Rates

Sectors	Indirect Tax	Import Tariff	Non-competitive Import Tariff	Export Tax
Paddy	0.019	0.167		
Other Food Crops	0.035	0.172		
Cash Crops	0.029	0.081		0.01
Livestock and Fisheries	0.01	0.071		0.011
Forestry	0.027		0.583	
Mining and Quarrying	0.003	0.179		
Manufacturing	0.121	0.11	0.118	0.011
Construction	0.013		0.204	
Gas, Electricity & Water	0.008	0.178	0.012	
Hotel & Restaurants	0.051		0.015	0.011
Transport & Communication	-0.0002	0.076	0.126	0.011
Wholesale & Retail Trade	0.0005	0.043		0.011
Business, Real Estate & Dwelling	0.005		0.311	
Government Services				
Other Services	0.002		0.004	

6.13 Output and Value Added

Table 6.7: Cobb-Douglas Production Function on Primary Factors

Sectors	Constant term	Elasticity Coeff. with non-skilled labor	Elasticity coeff. With skilled labor
Paddy	1.672	0.425	0.033
Other Food Crops	1.585	0.561	0.054
Cash Crops	1.727	0.35	0.037
Livestock and Fisheries	1.571	0.478	0.022
Forestry	1.717	0.309	0.034
Mining and Quarrying	1.641	0.33	0.02
Manufacturing	1.861	0.191	0.082
Construction	1.739	0.359	0.04
Gas, Electricity & Water	1.983	0.22	0.106
Hotel & Restaurants	1.892	0.291	0.073
Transport & Communication	2.201	0.272	0.167
Wholesale & Retail Trade	1.406	0.058	0.038
Business, Real Estate & Dwelling	2.168	0.282	0.155
Government Services			
Other Services	2.101	0.448	0.346

6.14 Foreign Trade

Table 6.8: Constant Elasticity of Transformation of Domestic and Export Goods

Sectors	B-T	DELTA-T	RHO_T	SIGMA-T
Paddy	51.71	1	2.25	0.8
Other Food Crops	34.581	1	2.25	0.8
Cash Crops	5.04	0.953	1.909	1.1
Livestock and Fisheries	9.702	0.994	2.25	0.8
Forestry	41.113	1	2.25	0.8
Mining and Quarrying		1	3.5	0.4
Manufacturing	2.68	0.859	2.25	0.8
Construction		1	2.25	0.8
Gas, Electricity & Water		1	2.25	0.8
Hotel & Restaurants	2.159	0.219	3.5	0.4
Transport & Communication	2.162	0.71	2.25	0.8
Wholesale & Retail Trade	2.549	0.835	2.25	0.8
Business, Real Estate & Dwelling		1	2.111	0.9
Government Services				0.8
Other Services	18.979	1	1	0.6

Table 6.9: Constant Elasticity of substitution between Imported and Domestic Goods

Sectors	B-S	DELTA-S	RHO_S	SIGMA-S
Paddy	1.003	0	1	0.5
Other Food Crops	1.025	0.001	0.429	0.7
Cash Crops	1.036	0	4	0.2
Livestock and Fisheries	1.058	0.006	0.25	0.8
Forestry	1.451		1.5	0.4
Mining and Quarrying		0.132	-0.091	1.1
Manufacturing	1.817	0.232	0.667	0.6
Construction			0.25	0.8
Gas, Electricity & Water	1.057	0.0002	1.5	0.4
Hotel & Restaurants			-0.091	1.1
Transport & Communication	1.284	0.031	0.667	0.6
Wholesale & Retail Trade	1.125	0.004	1	0.5
Business, Real Estate & Dwelling			0.25	0.8
Government Services				0.7
Other Services			2.333	0.3

Many of the parameters of the model, such as the tables of input-output coefficients (io), distributions of returns to labor and capital by household type, derive directly from the benchmark data. Other coefficients are implicit in the benchmark data, given the functional forms used in the model equation and other parameters. These coefficients are calibrated so that the model produces the base SAM when no exogenous variables are changed. One other major parameter, the marginal propensity to save for households, can be chosen independently of the SAM. In the simulation runs for this paper, however, the marginal propensity to save is set equal to the average savings rate from the SAM.

Following Harberger (1962), unit convention is used to separate the benchmark equilibrium data for the SAM into separate price and quantity observation. For example, by assuming the net-of –tax price of labour to be one in the bench mark equilibrium, the quantity of labour demanded in sector i is determined directly by the value added data on labour use in sector i. With this separation of value observations in the SAM into price and quantity observations complete, model calibration is implemented for the CES functions in the ways described in Mansur and Whalley (1984) using elasticity parameters from the literature search.

6.4. Counter-factual Simulations

6.4.1 Discussion of Result

The following simulation runs were made to know the economy-wide effects of policy changes.

Simulation 1: Reducing the import duty across the board by 25 % on the competitive imports and elimination of input tariff to zero.
Simulation 2: Currency depreciation by 20 %.
Simulation 3: Increasing skilled wages by 20 %.

Simulation 1: Reduction of import duty across the board by 25% and elimination of duty on intermediate imports.

Reduction in import duty in both competitive imports and intermediate imports is a major part of trade policy reforms, which Nepal has also taken between 1987-95 during the stabilization, structural adjustment and enhanced structural adjustment program adopted in Nepal. This policy is expected to correct the relative prices and improves resource allocation and improves competitiveness of domestic production. As expected the import demand increase in agriculture, mining and gas, electricity and water. However, the increase in import demand are very low and this may be due to inelastic imports demand in most sectors. Furthermore, to have the good simulation results, this policy should come in combination with exchange rate depreciation. Because of this reason, simulation results in increased import demand are not seen as they are expected to be. The manufacturing witnessed slight decline in import demand. Similarly, transport and communication and wholesale and retail trade import demand declined by 2 percent and 8 percentage points respectively.

In the export front, all the sector response positively, however the elasticities are low. The revenue from export duty increases significantly in the manufacturing, hotel and restaurants, transport and communication and wholesale and retail trade sector.

The effect on the government income is negative, government income reduces by 9.8 percentage points. This is because, the policy reduces the revenue from import tariffs nearly proportionately in all sector except transport and communication and wholesale and retail trade, where import revenue loss is more than proportionate.

The effect of the policies in the labor market are strongly felt in the reduction of qualified labor in construction and wholesale and retail trade whereas increased demand for qualified labor was witnessed in hotel and restaurants. The effect of the policies in the demand for unqualified labor is quite low in agriculture sector; whereas construction, wholesale and retail trade witnesses 5.7 percent and 12.3 percent reduction in labor demand respectively. Similarly, hotel and restaurant sector experiences increased demand for unqualified labor.

Simulation 2: Currency depreciation by 20 percent

Depreciation of currency by 20 percent increases import prices by 20 percent for the imports while Nepalese export price will be lower by 20 percent As a result, imports become dearer and are expected to decline while exports are expected to increase.The effect of policy in the import front are as expected, but because of the inelasticity of import demand in most of the sector, decrease in import demand is quite weaker. However, import demand in the wholesale and retail trade increases despite the depreciation of currency. In the export front, all the sector experience significant growth in export due to higher competitiveness except wholesale and retail trade.

The effect of depreciation on government saving is quite significant, it decreases by 190%. In the indirect taxes front, the effect is positive. This must be through increased export duty revenue due to beneficial effects on exports.

Simulation 3: Increasing skilled wages by 20%.

Increase in skilled wages by 20% will affect the labor demand in the sectors which are skill intensive to skilled wages. The effect will depend on the share of skilled employees to total employment in the sector and degree of substitutability (elasticity of substitution between skilled and unskilled labor). As skilled labor become too expensive to hire, firms try to substitute unskilled labor to skilled labor. As a consequence, demand for unskilled labor increases. Increasing the skilled wages by 20 percent means relative price of unskilled labor declines in relative terms and thus increases the demand for unskilled labor where there is possibility of substitution of skilled labour by unskilled labour.

Demand for unskilled labor increases in all the sectors except mining and quarrying, hotel and restaurants, transport and communication. Labor demand in the agriculture sector increases slightly, between one to two percentage points, whereas manufacturing, construction, forestry, gas and electricity, business, real-estate and dwelling all experience increased labor demand, but most noticeable increase are witnessed in the wholesale and retail trade. Qualified labor demand in all sector declines significantly, but the elasticity is less than one in all sector except hotel and restaurants, where it is more than one. On the other hand, labor demand for unqualified labor increases in most of the sectors.

6.10: Effects on Policy Simulation in Major Variables

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Wage rate	0.5	-0.006	0.222	-1.766
Houeshold Consumption-non-poor	24252	-1.087	8.498	2.723
Household consumption:poor	21822	-0.238	3.09	-0.156
Public Consumption	6570	0.67		-11.784
Exchange Rate	1		20	
Producer Price Index	1	-1.731	8.606	3.463
Labour Supply	53078			
Private Investment	7462	-8.055	19.921	-0.162
Public Investment	4986	-4.31	13.848	3.295
Current Account Balance	3229			

6.4.2 Welfare Implications of the Simulation

In order to evaluate the welfare effects of the policies to non-poor and poor householdsequivalent variations were computed using the following formula:

$$EV = \mu (p^{O}; p', y') - \mu (p^{O}; p^{O}, y^{O}) = \mu (p^{O}; p', y') - y^{O}$$

Where, $\mu (p^{O}; p', y')$ and $\mu (P^{O}; P^{O}, Y^{O})$ are the new and old income, respectively at base year prices.

Table 6.11: Equivalent Variation Under Different Simulation for Non-poor and Poor Households

	Non-poor Households	Poor–Households
Simulation 1	21.008	218.017
Simulation 2	-9.756	19.926
Simulation 3	367.341	-340.037

This result shows that reduction of tariffs in competitive imports and elimination of import duties on intermediate inputs increases the welfare of the poor households compared to the non-poor. The devaluation hurts non-poor households and slightly benefits poor households. The increase in wages of the skilled labour and public servants increases the welfare of non-poor but hurts poor household very much.

Table 6.12: Effects on rental price of capital

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1	0.005	-0.174	0.283
Other Food Crops	1	0.009	-0.322	0.053
Cash Crops	1	0.092	2.74	-0.169
Livestock and Fisheries	1	-0.341	2.596	-0.019
Forestry	1	-1.644	-6.555	2.456
Mining and Quarrying	1	-0.438	10.735	-2.817
Manufacturing	1	0.814	12.913	0.484
Construction	1	-5.725	13.988	-0.377
Gas, Electricity & Water	1	0.235	3.31	1.848
Hotel & Restaurants	1	2.17	13.781	-9.19
Transport & Communication	1	1.308	13.436	-2.527
Wholesale & Retail Trade	1	-12.337	87.978	40.501
Business, Real Estate & Dwelling	1	0.021	3.329	3.443
Government Services	1			
Other Services	1	-0.007	1.454	3.487

Table 6.15: Effects on Domestic Price

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1.019	-0.72	4.263	1.743
Other Food Crops	1.035	-0.784	4.77	1.853
Cash Crops	1.03	-0.389	2.809	0.931
Livestock and Fisheries	1.027	-0.482	2.619	0.366
Forestry	1.027	-0.937	2.231	1.422
Mining and Quarrying	1.003	-1.433	8.813	1.782
Manufacturing	1.146	-3.301	8.362	1.606
Construction	1.013	-4.129	9.71	0.258
Gas, Electricity & Water	1.008	-0.655	5.939	2.93
Hotel & Restaurants	1.131	-1.541	6.655	-3.206
Transport & Communication	1	-4.147	10.238	6.029
Wholesale & Retail Trade	1.001	-10.733	60.825	32.092
Business, Real Estate & Dwelling	1.005	-0.631	3.258	4.012
Government Services				
Other Services	1.002	-1.012	8.749	3.671

Table 6.16: Effects on consumer prices

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1.019	-0.726	4.292	1.739
Other Food Crops	1.036	-0.808	4.89	1.837
Cash Crops	1.031	-0.431	3.298	0.904
Livestock and Fisheries	1.011	-0.5	2.876	0.36
Forestry	1.027	4.933	21.367	-5.184
Mining and Quarrying	1.02	-1.698	9.989	1.584
Manufacturing	1.134	-3.032	12.069	1.082
Construction	1.013	-4.129	9.71	0.258
Gas, Electricity & Water	1.013	-0.768	6.432	2.825
Hotel & Restaurants	1.131	-1.541	6.655	-3.206
Transport & Communication	1.008	-3.876	11.333	5.326
Wholesale & Retail Trade	1.003	-10.163	58.197	30.033
Business, Real Estate & Dwelling	1.005	-0.631	3.258	4.012
Government Services	1	-0.655	4.676	13.358
Other Services	1.002	-1.012	8.749	3.671

Table 6.13:Effects on net prices (value added prices)

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Other Food Crops	1			
Cash Crops	1	0.054	1.752	-0.057
Livestock and Fisheries	1	-0.174	1.397	-0.461
Forestry	1	-1.085	-4.291	1.685
Mining and Quarrying	1	-0.287	6.931	-2.059
Manufacturing	1	0.59	9.276	1.518
Construction	1	-3.483	8.272	-0.14
Gas, Electricity & Water	1	0.157	2.269	2.819
Hotel & Restaurants	1	1.372	8.623	-5.168
Transport & Communication	1	0.73	7.389	1.13
Wholesale & Retail Trade	1	-11.221	76.942	36.801
Business, Real Estate & Dwelling	1	0.01	1.925	4.317
Government Services	1			
Other Services	1	-0.004	0.398	6.416

Table 6.14: Effects on Producer Prices

Sectors	Base Year	Percentage Change Simulation 1 Tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1	-0.72	4.277	1.741
Other Food Crops	1	-0.783	4.796	1.85
Cash Crops	1	-0.376	3.432	0.9
Livestock and Fisheries	1	-0.474	2.925	0.36
Forestry	1	-0.936	2.253	1.421
Mining and Quarrying	1	-1.433	8.813	1.782
Manufacturing	1	-2.78	10.243	1.356
Construction	1	-4.129	9.71	0.258
Gas, Electricity & Water	1	-0.655	5.939	2.93
Hotel & Restaurants	1	-0.641	14.516	-1.331
Transport & Communication	1	-2.768	13.52	4.078
Wholesale & Retail Trade	1	-8.351	52.829	25.78
Business, Real Estate & Dwelling	1	-0.631	3.258	4.012
Government Services	1	-0.665	4.676	13.358
Other Services	1	-1.003	8.853	3.638

Table 6.17: Effects on import prices

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1.167	-3.571	20	
Other Food Crops	1.172	-3.676	20	
Cash Crops	1.081	-1.863	20	
Livestock and Fisheries	1.071	-1.647	20	
Forestry	1			
Mining and Quarrying	1.179	-3.804	20	
Manufacturing	1.11	-2.472	20	
Construction	1			
Gas, Electricity & Water	1.178	-3.774	20	
Hotel & Restaurants	1			
Transport & Communication	1.076	-1.773	20	
Wholesale & Retail Trade	1.043	-1.042	20	
Business, Real Estate & Dwelling	1			
Government Services				
Other Services	1			

Table 6.18: Effects on World Prices of Imports

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1			
Other Food Crops	1			
Cash Crops	1			
Livestock and Fisheries	1			
Forestry	1			
Mining and Quarrying	1			
Manufacturing	1			
Construction	1			
Gas, Electricity & Water	1			
Hotel & Restaurants	1			
Transport & Communication	1			
Wholesale & Retail Trade	1			
Business, Real Estate & Dwelling	1			
Government Services	1			
Other Services	1			

Table 6.19: Effects on domestic Price of Exports

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1		20	
Other Food Crops	1		20	
Cash Crops	1		20	
Livestock and Fisheries	1		20	
Forestry	1		20	
Mining and Quarrying	1		20	
Manufacturing	1		20	
Construction	1		20	
Gas, Electricity & Water	1		20	
Hotel & Restaurants	1		20	
Transport & Communication	1		20	
Wholesale & Retail Trade	1		20	
Business, Real Estate & Dwelling	1		20	
Government Services	1		20	
Other Services	1		20	

Table 6.20: Effects on World Price of exports

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	1			
Other Food Crops	1			
Cash Crops	1.01			
Livestock and Fisheries	1.011			
Forestry	1			
Mining and Quarrying	1			
Manufacturing	1.011			
Construction	1			
Gas, Electricity & Water	1			
Hotel & Restaurants	1.011			
Transport & Communication	1.011			
Wholesale & Retail Trade	1.011			
Business, Real Estate & Dwelling	1			
Government Services				
Other Services	1			

Table 6.21: Effects on Value Added

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	7553	0.005	-0.174	0.283
Other Food Crops	4658	0.009	-0.322	0.053
Cash Crops	6203	0.038	0.972	-0.112
Livestock and Fisheries	9124	-0.168	1.182	0.444
Forestry	2909	-0.565	-2.366	0.759
Mining and Quarrying	100	-0.152	3.558	-0.774
Manufacturing	3156	0.223	3.329	-1.019
Construction	5040	-2.322	5.279	-0.238
Gas, Electricity & Water	414	0.078	1.018	-0.944
Hotel & Restaurants	667	0.787	4.748	-4.24
Transport & Communication	3594	0.574	5.631	-3.616
Wholesale & Retail Trade	2238	-1.257	6.237	2.705
Business, Real Estate & Dwelling	4715	0.011	1.378	-0.838
Government Services	4209	0.667	-4.441	-11.742
Other Services	867	-0.003	1.052	-2.753

Table 6.22: Effects on gross output

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	11097	0.005	-0.174	0.283
Other Food Crops	7863	0.009	-0.322	0.053
Cash Crops	8620	0.038	0.972	-0.112
Livestock and Fisheries	10545	-0.168	1.182	0.444
Forestry	4105	-0.565	-2.366	0.759
Mining and Quarrying	370	-0.152	3.558	-0.774
Manufacturing	12182	0.223	3.329	-1.019
Construction	6675	-2.322	5.279	-0.238
Gas, Electricity & Water	1412	0.078	1.018	-0.944
Hotel & Restaurants	1976	0.787	4.748	-4.24
Transport & Communication	8098	0.574	5.631	-3.616
Wholesale & Retail Trade	4286	-1.257	6.237	2.705
Business, Real Estate & Dwelling	5725	0.011	1.378	-0.838
Government Services	6596	0.667	-4.441	-11.742
Other Services	2111	-0.003	1.052	-2.753

Table 6.23: Effects on Capital

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	4096			
Other Food Crops	1797			
Cash Crops	3806			
Livestock and Fisheries	4562			
Forestry	1911			
Mining and Quarrying	65			
Manufacturing	2294			
Construction	3029			
Gas, Electricity & Water	279			
Hotel & Restaurants	424			
Transport & Communication	2015			
Wholesale & Retail Trade	2023			
Business, Real Estate & Dwelling	2655			
Government Services				
Other Services	179			

Table 6.24: Effects on non-skilled labour

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 E+ 20%	Simulation 3 wq +20%
Paddy	6414	0.011	-0.395	2.086
Other Food Crops	5222	0.015	-0.543	1.852
Cash Crops	4338	0.098	2.512	1.627
Livestock and Fisheries	8724	-0.335	2.368	1.779
Forestry	1796	-1.638	-6.763	4.299
Mining and Quarrying	66	-0.432	10.49	-1.069
Manufacturing	1206	0.82	12.663	2.291
Construction	3620	-5.719	13.735	1.414
Gas, Electricity & Water	182	0.241	3.081	3.68
Hotel & Restaurants	388	2.176	13.529	-7.557
Transport & Communication	1958	1.314	13.185	-0.774
Wholesale & Retail Trade	258	-12.331	87.561	43.027
Business, Real Estate & Dwelling	2660	0.027	3.1	5.303
Government Services				
Other Services	776	-0.001	1.229	5.348

Table 6.25: Effects on Skilled Labour

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy		0.005	-0.174	-16.431
Other Food Crops		0.009	-0.322	-16.622
Cash Crops		0.092	2.74	-16.807
Livestock and Fisheries		-0.341	2.596	-16.683
Forestry		-1.644	-6.555	-14.62
Mining and Quarrying		-0.438	10.735	-19.014
Manufacturing		0.814	12.913	-16.264
Construction		-5.725	13.988	-16.981
Gas, Electricity & Water		0.235	3.31	-15.126
Hotel & Restaurants		2.17	13.781	-24.325
Transport & Communication		1.308	13.436	-18.773
Wholesale & Retail Trade		-12.337	87.978	17.084
Business, Real Estate & Dwelling		0.021	3.329	-13.798
Government Services		0.667	-4.441	-11.742
Other Services		-0.007	1.454	-13.761

Table 6.26: Effects on Consumption of non-poor household

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	5533	-0.152	2.238	1.488
Other Food Crops	2697	-0.103	1.612	1.118
Cash Crops	2910	-0.119	1.396	0.948
Livestock and Fisheries	3958	-0.191	2.483	1.737
Forestry	974	-1.061	-0.691	2.706
Mining and Quarrying	66	0.031	0.993	1.331
Manufacturing	5232	0.339	0.859	1.838
Construction				
Gas, Electricity & Water	400	0.163	2.05	1.44
Hotel & Restaurants	7	0.006	2	2.878
Transport & Communication	34	0.532	1.007	2.892
Wholesale & Retail Trade	61	2.083	-5.701	-3.389
Business, Real Estate & Dwelling	1111	-0.192	2.778	1.177
Government Services	5	-0.185	2.447	-0.704
Other Services	187	-0.11	1.545	1.252

Table 6.27: Effects on poor household

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	3670	0.222	-5.025	-1.217
Other Food Crops	4264	0.1	-2.149	-0.52
Cash Crops	3774	0.069	-2.059	-0.451
Livestock and Fisheries	1953	0.15	-4.07	-0.819
Forestry	2487	-0.377	-3.238	0.037
Mining and Quarrying	44	0.186	-2.602	-0.539
Manufacturing	3516	0.857	-7.573	-1.392
Construction				
Gas, Electricity & Water	270	0.29	-6.703	-1.775
Hotel & Restaurants	4	0.553	-7.75	-0.449
Transport & Communication	22	1.237	-8.584	-2.648
Wholesale & Retail Trade	40	3.255	-14.217	-7.389
Business, Real Estate & Dwelling	740	0.295	-7.097	-2.333
Government Services	3	0.247	-5.985	-3.584
Other Services	124	0.403	-8.132	-2.25

Table 6.28: Effects on household consumption

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	9203	-0.003	-0.659	0.409
Other Food Crops	6962	0.021	-0.692	0.115
Cash Crops	6685	-0.012	-0.555	0.158
Livestock and Fisheries	5911	-0.078	0.318	0.892
Forestry	3460	-0.57	-2.521	0.788
Mining and Quarrying	110	0.094	-0.452	0.58
Manufacturing	8747	0.547	-2.53	0.54
Construction				
Gas, Electricity & Water	670	0.02	-1.482	0.143
Hotel & Restaurants	12	0.217	-1.75	1.598
Transport & Communication	56	0.809	-2.761	-0.499
Wholesale & Retail Trade	101	2.547	-9.073	-4.973
Business, Real Estate & Dwelling	1851	0.003	-1.17	-0.226
Government Services	6578	0.669	-4.463	-11.771
Other Services	310	0.095	-2.313	-0.144

Table 6.29: Effects on Private investment

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy				
Other Food Crops				
Cash Crops				
Livestock and Fisheries	188	-7.593	16.569	-0.52
Forestry				
Mining and Quarrying				
Manufacturing	1754	-5.18	7.006	-1.231
Construction	3786	-4.095	9.307	-0.419
Gas, Electricity & Water				
Hotel & Restaurants				
Transport & Communication	982	-4.347	7.713	-5.211
Wholesale & Retail Trade	458	2.347	-24.195	-23.221
Business, Real Estate & Dwelling				
Government Services				
Other Services				

Table 6.30: Effect on public investment

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy				
Other Food Crops				
Cash Crops				
Livestock and Fisheries			16.569	
Forestry				
Mining and Quarrying				
Manufacturing	839		7.006	
Construction	2889		9.307	
Gas, Electricity & Water				
Hotel & Restaurants				
Transport & Communication	748		7.713	
Wholesale & Retail Trade	353		-24.195	
Business, Real Estate & Dwelling				
Government Services				
Other Services				

Table 6.31: Effects on non-competitive imports

Sectors	Base Year	Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	392	0.005	-0.174	0.283
Other Food Crops	358	0.009	-0.322	0.053
Cash Crops	44	0.038	0.972	-0.112
Livestock and Fisheries				
Forestry	24	-0.565	-2.366	0.759
Mining and Quarrying				
Manufacturing	2250	0.223	3.329	-1.019
Construction	324	-2.322	5.279	-0.238
Gas, Electricity & Water	165	0.078	1.018	-0.944
Hotel & Restaurants	982	0.787	4.748	-4.24
Transport & Communication	1046	0.574	5.631	-3.616
Wholesale & Retail Trade	7	-1.257	6.237	2.705
Business, Real Estate & Dwelling	61	0.011	1.378	-0.838
Government Services	632	0.667	-4.441	-11.742
Other Services	551	-0.003	1.052	-2.753

Table 6.32: Effects on intermediste consumption

		Percentage Change		
Sectors	Base Year	Simulation 1 tm -25% tmi=0	Simulation 2 E+ 20%	Simulation 3 wq +20%
Paddy	3125	0.005	-0.174	0.283
Other Food Crops	2815	0.009	-0.322	0.053
Cash Crops	2344	0.038	0.972	-0.112
Livestock and Fisheries	1392	-0.168	1.182	0.444
Forestry	1123	-0.565	-2.366	0.759
Mining and Quarrying	260	-0.152	3.558	-774
Manufacturing	6243	0.223	3.329	-1.019
Construction	1128	-2.322	5.279	-0.238
Gas, Electricity & Water	817	0.078	1.018	-0.944
Hotel & Restaurants	298	0.787	4.748	-4.24
Transport & Communication	3246	0.574	5.631	-3.616
Wholesale & Retail Trade	2020	-1.257	6.237	2.705
Business, Real Estate & Dwelling	887	0.011	1.378	-0.838
Government Services	1641	0.667	-4.441	-11.742
Other Services	650	-0.003	1.052	-2.753

Table 6.33: Effects on imports

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	18	1.472	-6.959	1.154
Other Food Crops	58	2.101	-9.374	1.349
Cash Crops	236	0.322	-2.751	0.107
Livestock and Fisheries	156	0.771	-10.935	0.742
Forestry				
Mining and Quarrying	39	2.559	-7.001	1.173
Manufacturing	5003	-0.717	-4.134	0.128
Construction				
Gas, Electricity & Water	45	1.363	-3.894	0.207
Hotel & Restaurants				
Transport & Communication	655	-2.017	-1.941	1.324
Wholesale & Retail Trade	207	-8.171	28.109	22.756
Business, Real Estate & Dwelling				
Government Services				
Other Services				

Table 6.34: Effects on exports

Sectors	Base Year	Percentage Change Simulation 1 tm –25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	9	0.584	11.697	-1.092
Other Food Crops	13	0.64	11.089	-1.403
Cash Crops	295	0.453	18.9	-1.092
Livestock and Fisheries	176	0.212	14.401	0.156
Forestry	5	0.185	10.969	-0.372
Mining and Quarrying				
Manufacturing	2130	2.509	10.583	-2.08
Construction				
Gas, Electricity & Water				
Hotel & Restaurants	1211	1.047	6.727	-3.726
Transport & Communication	2661	2.859	10.428	-6.649
Wholesale & Retail Trade	918	5.878	-12.45	-14.513
Business, Real Estate & Dwelling				
Government Services				
Other Services	19	0.604	7.139	-4.816

Table 6.35: Effects on composite output

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	11106	0.007	-0.197	0.286
Other Food Crops	7908	0.025	-0.422	0.066
Cash Crops	8561	0.032	0.208	-0.073
Livestock and Fisheries	10525	-0.159	0.74	0.453
Forestry	4100	-0.566	-2.383	0.76
Mining and Quarrying	409	0.144	2.34	-0.561
Manufacturing	15055	-0.373	-0.119	-0.516
Construction	6675	-2.322	5.279	-0.238
Gas, Electricity & Water	1457	0.123	0.831	-0.903
Hotel & Restaurants	765	0.421	1.811	-4.973
Transport & Communication	6092	-0.736	2.57	-1.782
Wholesale & Retail Trade	3575	-3.622	11.576	7.65
Business, Real Estate & Dwelling	5725	0.011	1.378	-0.838
Government Services	6596	0.667	-4.441	-11.742
Other Services	2092	-0.008	0.994	-2.734

Table 6.36: Effects on domestic taxes

Sectors	Base Year	Percentage Change Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	212	-0.715	4.095	2.029
Other Food Crops	273	-0.774	4.458	1.904
Cash Crops	248	-0.338	4.437	0.787
Livestock and Fisheries	101	-0.641	4.142	0.805
Forestry	111	-1.496	-0.166	2.19
Mining and Quarrying	1	-1.583	12.684	0.994
Manufacturing	1469	-2.563	13.913	0.324
Construction	85	-6.355	15.501	0.019
Gas, Electricity & Water	11	-0.578	7.018	1.959
Hotel & Restaurants	100	0.141	19.953	-5.515
Transport & Communication	-2	-2.21	19.913	0.315
Wholesale & Retail Trade	2	-9.503	62.361	29.182
Business, Real Estate & Dwelling	31	-0.62	4.681	3.141
Government Services				
Other Services	5	-1.006	9.997	0.785

Table 6.37: Effects on revenue from import tariff

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy	3	-23.896	11.65	1.154
Other Food Crops	10	-23.424	8.751	1.349
Cash Crops	19	-24.758	16.699	0.107
Livestock and Fisheries	11	-24.422	6.878	0.742
Forestry				
Mining and Quarrying	7	-23.081	11.587	1.173
Manufacturing	549	-25.538	15.039	0.128
Construction				
Gas, Electricity & Water	8	-23.978	15.327	0.207
Hotel & Restaurants				
Transport & Communication	50	-26.513	17.67	1.324
Wholesale & Retail Trade	9	-31.129	53.731	22.756
Business, Real Estate & Dwelling				
Government Services				
Other Services				

Table 6.38: Effects on revenue from export duty

Sectors	Base Year	Percentage Change		
		Simulation 1 tm -25% tmi=0	Simulation 2 e+ 20%	Simulation 3 wq +20%
Paddy				
Other Food Crops				
Cash Crops	3	0.453	42.68	-1.092
Livestock and Fisheries	2	0.212	37.281	0.156
Forestry				
Mining and Quarrying				
Manufacturing	23	2.509	32.699	-2.08
Construction				
Gas, Electricity & Water				
Hotel & Restaurants	13	1.047	28.072	-3.726
Transport & Communication	29	2.859	32.513	-6.649
Wholesale & Retail Trade	10	5.878	5.06	-14.513
Business, Real Estate & Dwelling				
Government Services				
Other Services				

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Appendix-I
Specification of Nepalese CGE Model

Model Specification

The specification of model equation follows closely that in Dervis, de Melo, and Robinson (1982) and in Condon, Dahl, and Devarajan (1987). The equations are presented in the following order: production and factor demand, industry value added functions, intermediate demands, labour market, income, expenditure and saving of households and other institutions, foreign trade, price and equilibrium conditions.

Production –Factor Demand

Aggregate output of the economy is produced through the Leontief technology implying a fixed ratio between value added and intermediate demand.

(1). $X_i^S = LF\ (VA_i, IC_i; IO_i, v_i)$

We have, $vi = VA_i/X_i^S$ and $io_i = IC_i / X_i^S$;

Or, $X_i^S = IC_i / io_i$ and $X_i^S = VA_i / v_i$

Together, $IC_i / io_i = VA_i / v_i$

$X_i^S = \min\ (IC_i / io_i\ , VA_i / v_i\ )$

Where, X_i^s is production of the ith branch, LF is the Leontief technology , VAi is the value added of the ith branch and ICi is the intermediate consumption of the ith sector. The io_i and v_i are the Leontief technical coeffiecients of domestic intermediate inputs and value added, respectively and are defined as:

$vi = VA_i/X_i^s$ and $io_i = IC_i / X_i^s$;

or, $X_i^s = IC_i / io_i$ and $X_i^s = VA_i / v_i$

Together, $IC_i / io_i = VA_i / v_i$

$X_i^s = \min\ (IC_i / io_i\ , VA_i / v_i)$

Industry Value-added Functions

Value added is generated through the Cobb-Douglas technology with the use of primary factor labor and capital.

$VA_n = CD\ (K_n, L_{ln}^D; A_n\, \alpha_{ln}) = A_n\ (L_{ln}^D)^{\alpha ln}\ (K_n)^{(1-\Sigma\alpha ln)}$ ....(2)

Where, CD is the Cobb-Douglas technology, K is the capital, L is the labour , A is the scale parameter of the Cobb-Douglas technology, and α_{ln} is Cobb-Douglas elasticities by labour categories.

From the first order condition of optimizing behavior , we have,
MPL = (w/PVA); MPK = (r/PVA).

Value added in the government sector is assumed to be equal to the demand of employment in the government sector.

$VA_{ad} = L_{ad}^{D}$ ....(3)

Where, L_{ad}^{D} is the labour demand in the government sector.

Intermediate Demands

Intermediate demand is a derived Leontief technology. Intermediate consumption is derived from sectoral production levels and input-output coefficients.

$IC_i = LF^*(X_i^s)$

Where, LF* is the derived Leontief technology.

We have, $vi = VA_i/X_i^s$ and $io_i = IC_i / X_i^s$;

Together, $IC_i/io_i = VA_i/v_i$;

$IC_i = io_i . VA_i /v_i$ ....(4)

Demand for intermediate imports are normally taken as non-competitive imports in a developing country. We think that Nepal also belongs in this group. Thus, it is natural to model demand for non-competitive imports in terms of Leontief technology.

$ICNCI_i = noi_i . VA_i/v_i$ ....(5)

Where, $ICNCI_i$ is the demand for non-competitive imports and noi_i is the Leointief technical coefficients for non-competitive imports.

Inter-Industry Transactions are given by

$ICJ_{ij} = a_{ij} IC_j$

$\Rightarrow a_{ij} = ICJ_{ij} / IC_j$ ....(6)

where, a_{ij} are the familiar Leontief input-output coeffcients.

Treatment of the Labour Market

Labor market takes into account the dichotomy existing in the Nepalese labour market between formal and informal sectors. Labour demand for the commercial sectors is derived from the optimizing behavior of the Cobb-Douglas technology. This is determined by the relative price of value added to the wage rate and value added generated in the sectors.

$$L_{ln}^{D} = CD^{*} (P_n^{VA}/w_l, VA_n; \alpha_{ln})$$

where, L_{ln}^{D} is branch n's labour demand by category l, P_n^{VA} is the price of value added and w_l is the wage rate of labour of cateory l.

The labour demand for non-qualified and qualified labour are provided by the following equations:

$$L_{nq.n}^{D} = CD^{*} (P_n^{VA}/w_{nq}, VA_n; \alpha_{nq \cdot n}) = \alpha_{nq \cdot n} (P_n^{VA}/w_{nq})VA_n \quad \text{.....(7)}$$

$$L_{qn}^{D} = CD^{*} (P_n^{VA}/w_q, VA_n; \alpha_{qn}) = \alpha_{qn} (P_n^{VA}/w_q)VA_n \quad \text{.....(8)}$$

Labour demand for the government sector is determed by the ratio of value added to the wage rate.

$$L_{ad}^{D} = (P_{ad} X_{ad}^{s} - \Sigma_j P_j^{c} ICJ_{j\ ad} - P^{nc} ICNCI_{ad})/w \quad \text{.....(9)}$$

A. Income and Savings

Household income consists of wage income, rental income , dividend and transfers.

$$Y_h = \Sigma_l \gamma_{hl} w_l \Sigma_i L_{li}^{D} + \phi \lambda_h \Sigma_n R_n K_n + Div_h + eT_{rh} + T_{gh} \quad \text{.....(10)}$$

where, Y_h^H is total household income by h households, R_n is the rate of return on capital, DIV_h is dividend distributed to household h, T_{GF} is government transfer payments to firms (volume), T_{RH} is foreign transfer payments to households by category h, T_{FR} is firms transfer payments to the rest of the world, e is exchange rate (NRs per US dollar). The γ_{hl}, w_l, ϕ and λ_h, are prameters. γ_{hl} is share of labour income of category l by household h, w_l is wage rate by labour category, ϕ_h is share of household capital income, and λ_h is household share of capital income of household h.

Firms capital income is defined as the share of non-household rental income.

$$Y_k = (1-\lambda_h)\Sigma_n R_n K_n \quad \text{.....(11)}$$

where, K is firm capital income

Dividend is assumed as a fixed rate of the firms capital income

$DIV_h = dvr_h\ Yk$ ....(12)

Where, dvr_h is dividend rate of households h

Household saving is defined as a fixed percent of the disposable income of the household.

$S_H = mps\ YD_H$ ....(13)

where, S_h^H is household savings, mps is marginal propensity to save parameter, and YD_H is household disposable income.

Disposable income is derived as household income net of income taxes.

$YD_H = (1-\chi.\ ty)Y_H$ ....(14)

Where, χ is tax adjustment parameter , ty_h is household income tax rate by category of household h ,

Firm income consists of firms capital income, government transfers to firms evaluated at producer prices and rest of the world transfer to firms at local currency.

$Y_F = YK + PINDEX\ T_{GF} + e.\ T_{RF}$ ....(15)
where, Y_F is firm total income, PINDEX is producer price index and e is the exchange rate.

Firm saving is derived through deducting the capital taxes, dividend and transfer to the rest of the worlds from the firm's total income.

$S_F = Y_F - tk\ YK - DIV - T_{FR}$ ....(16)

where, S_F is firm saving, tk is capital income tax rate,

Government income comprises of taxes from households, capital tax of the firms, production taxes, transfer from rest of the world to government, import tariff and export duty.

$$Y_G = \sum_h (\chi\ ty_h\ YH_h) + tk\ YK + \sum i\ TXS_i + eTRG$$

$$+ \sum_n TXM_n + \sum i\ TMNIi + \sum_n TXE_n \quad \text{.......(17)}$$

where, Y_G is government revenue, TXS_i is indirect taxes, TXM_n is revenue from import duties, TXE_n is revenue from export tariffs, S_G is government saving, Indirect taxes is equal to the tax revenue generated from total output at producer price.

$TXS_i = tx_i P_i X_i^S$ ....(18)

where, tx_i is indirect tax rate,

Import duty is equal to tariff collected at the domestic prices.

$TXM_n = tm_n \, e \, P_n^{WM} M_n$ ....(19)

Where, tm_n is import duty rate,

Export duty is equal to export duty collected at domestic prices.

$TXE_n = te_n P_n^E EX_n$ ....(20)

where, te_n is export tax rate

$TMNI_i = tmi_i \, PC^{NW}{}_i \, (e.ICNCI_i)$ ....(21)

where, tmi_i is tariff on intermediate imports,

Government saving is equal to government income less government transfer less total government consumption.

$S_G = Y_G - PINDEX \, T_{GF} - CT_G - TGR - \sum_h TGH_h$ ....(22)

DEMAND

Total household consumption is equal to disposable income of the households less saving of the households.

$CTH_h = YDH_h - SH_h$ ....(23)

where, CT_H is total household consumption.

The household consumption functrion as per LES is represented by equation (23).

$CH_{hi} = MINI_{hi} + \beta_{hi}^C \, (CTH_h - \sum_j P_j^C MINI_{hj}) / .P_i^C$ ....(24)

CH_{hi} is household consumption of good i by h households, Mini is subsistence level of consumption, β_{hi}^C is marginal share of good i in household consumption by household group h.

Government consumption is defined as the volume of consumption that the government sector consumes.

$CG_i = \beta_i^G CT_G/P_i^C$ ....(25)

Where, CG_i is public consumption of good i, where, β_i^G is share of good i in public consumption.

Total consumption of good i is a volume measure comprising of household and government consumption.
$C_i=\sum_h CH_{hi} + CG_i$ ....(26)

Where, C_i is consumption of good i (volume).

IT is total investment (value), INV_i is consumption of good i for investment uses (volume), IC_i is total intermediate consumption by branch, ICJ_{ij} is the intermediate consumption of good j by branch i,

Intermediate demand of good i is derived from the input-output relations and intermediate consumption of good i.

$INTD_i = \sum_j a_{ij} IC_j$ ....(27)

Where, $INTD_i$ is intermediate demand of good i (volume), , IC_i is total intermediate consumption by branch, ICJ_{ij} is the intermediate consumption of good j by branch i,

Investment is also a volume measure determined by the share of good i in the total volume of investment, normalized through composite price index.

$INV_{ki} = \beta_{ki}^I IT_k/P_i^C$ ....(28)

β_i^I is share of good i in total investment, β_i^X is branch i's share in total production ui is unemployment rate in sector i, μ is supply response to waiting unemployment

Where, , INV_i is consumption of good i for investment uses (volume), IT is total investment (value)

Total output is defined as the constant elasticity of transformation for domestic and export markets.

$X_n s = CET(EX_n, D_n; b_n^T, \delta_n^T, \rho_n^T) = b_n^T[\ (\delta_n^T EX_n^{\rho_n^T} + (1-\delta_n^T\ ) D_n^{\rho_n^T}\ ]^{1/\rho_n^T}$ ....(29)

Where, D_n is local demand for domestically produced goods (volume), b_n^T is CET scale parameter, δ_n^T is CET distributive share parameter, ρ_n^T is CET transformation parameter, σ_n^T is CET elasticity of transformation, Export demand is derived from the CET and is determined by the relative price of export to domestic price index, domestic output level and degree of transformation between domestic and export markets.

$EX_n = CET^*(P_n^E/P_n^D, D_n; \sigma_n^T) = D_n [P_n^E (1-\delta_n^T) / P_n^D \delta_n^T)]^{\sigma_n^T}$ ....(30)

Composite commodity Qn is a CES function of domestic and imported commodity,

$Q_n = CES(D_n, M_n; b_n^s, \delta_n^s, \rho_n^s) = b_n^s (\delta_n^s M^{-\rho_n^s} + (1-\delta_n^s) D_n^{-\rho_n^s})^{-1/\rho_n^s}$ ....(31)

Where, b_n^s is CES scale parameter, δ_n^s is CES distributive share parameter, ρ_n^s is CES substitution parameter, σ_n^s is CES elasticity of substitution parameter.

Government demand of the composite commodity is simply the government services or output.

$Q_{ad} = X_{ad}$ ....(32)

Import demand function is derived from the cost minimization of the CES.

$M_n = CES^*(P_n^M/P_n^D, D_n; \sigma_n^s) = D_n [P_n^D \delta_n^s / P_n^M (1-\delta_n^s)]^{\sigma_n^s}$ ....(33)

Current account balance is derived as the import (c.i.f.) plus transfer payments from the rest of the world less export (fob) less transfer from the rest of the world to households and less transfer from the rest of the world to government. The current account deficit is encountered if there is excess demand of goods and services.

$$CAB = (1/e)TGR + \sum_n P_n^{WM} M_n + \sum_i P^{NCW}{}_i ICNCI_i - \sum_h TRH_h - TRF - TRG - \sum_n P_n^{WE} EX_n \quad ....(34)$$

PRICE

Producer Price is a weighted average of price of domestically produced and consumed commodities and domestic price of exports, with the volume weights being the ratio of local demand for domestically produced goods i to total Production and ratio of exports (fob) to total production, adjusted for the indirect taxes.

$P_n = [(D_n/X_n^S) P_n^D + (EX_n/X_n^S)P_n^E] / (1+tx_i)$ ....(35)

Price of value added is the ratio of total output less intermediate consumption to the value added in the sector.

$P_n^{VA} = (P_n X_n^S - \sum_j P_j^C ICJ_{jn}) - PN^C{}_n ICNCI_n / VA_n$ ....(36)

Domestic price of imports is equal to world prices of imports evaluated at real exchange rate with the inclusive of import tariffs.

$P_n^M=(1+tm_n)eP_n^{WM}$ ....(37)

Domestic Price of exports is equal to world price of exports evaluated at real exchange rate and adjusted for the export taxes.

$P_n^E=eP_n^{WE}/(1+te_n)$ ....(38)

Rental rates of capital are defined as the ratio of operating surplus to the capital stock of the sector concerned.

$R_n=(P_n^{va}VA_n-\Sigma_h W_h L_{ln}^D)/K_n$ ....(39)

Composite Price P_n^C is defined as the weighted average price of domestic and import prices, the weights being the share of domestic and imported output in the composite commodity.

$P_n^C=(D_n/Q_n)P_n^D+(M_n/Q_n)P_n^M$ ....(40)

Price of the non-competitive imports is equal to the tariff on non-competitive imports mulktiplied by the world price of non-competive imports times exchange rate.

$P_i^{CN}=(1+tmi_i)P_i^{CNW}e$ ....(41)

Price of the government services is the domestic prices.

$P_{ad}^C=P_{ad}$ ....(42)

Producer Price Index is the weighted average domestic prices, the weights being the share of goods in the total domestic production.

$Pindex=\Sigma_i \beta_i^X P_i$ ....(43)

EQUILIBRIUM

In equilibrium, total investment is equal to domestic saving plus current account balance at domestic currency.

$IT_p=L_i^D+\Sigma SH_h+psS_F$ ....(44)

$IT_g=(1\text{-}ps).\ SF+SG+e.\ CAB$ ....(45)

Composite commodity Q is equal to consumption demand, intermediate demand and investment demand.

$Q_i = C_i + INTD_i + \sum_k INV_{ki}$ ....(46)

Labor supply is equal to labor demand.

$L_{li}{}^S = U_{li} + \sum_i L_{li}{}^D$ ....(47)

$u_i = U_{li} / L_{li}{}^S$ ....(48)

MODEL CLOSURE

MODEL SPECIFICATION

A. EQUATIONS

Number of Equations

A.1. Production –Factor Demand

A.1.1 Production

(1). $X_i^s = LF\,(VA_i, IC_i; IO_i, v_i)$

(2). $VA_n = CD\,(K_n, L_{ln}^D; A_n\,\alpha_{ln}) = A_n\,(L_{ln}^D)^{\alpha ln}\,(K_n)^{(1-\Sigma\alpha ln)}$

(3). $VA_{ad} = L_{ad}^D$

(4). $IC_i = LF^*(X_i^s)$

(5). $ICJ_{ij} = a_{ij}\,IC_j \Rightarrow a_{ij} = ICJ_{ij}/IC_j$

(6) $ICNCI_i = noi_i\,.\,VA_i/v_i$

A.1.2 Labour Market

(7). $L_{ln}^D = CD^*\,(P_n^{VA}/w_l, VA_n)$

(8). $L_{ad}^D = (P_{ad}\,X_{ad}^s - \Sigma_j\,P_j^c\,ICJ_{j\,ad} - P^{nc}\,ICNCI_{ad})/w$

A.2. Income and Savings

(9). $Y_h = \Sigma_l\,\gamma_{hl}\,w_l\,\Sigma_i\,L_{li}^D + \phi\,\lambda_h\,\Sigma_n\,R_n\,K_n + Div_h + eT_{rh} + T_{gh}$

(10). $Y_k = (1-\lambda)\Sigma_n\,R_n\,K_n$

(11). $DIV_h = dvr_h\,Yk$

(12). $S_H = mps\,YD_H$

(13). $YD_H = (1-\chi.\,ty)Y_H$

(14). $Y_F = YK + PINDEX\,T_{GF} + e.\,T_{RF}$

(15). $S_F = Y_F - tk\,YK - DIV - T_{FR}$

(16). $Y_G = \Sigma_h\,(\chi\,ty_h\,YH_h) + tk\,Y_K + \Sigma i\,TXS_i + eT_{RG}$
$+ \Sigma_n\,TXM_n + \Sigma_n\,TXE_n + \Sigma i\,TMNIi$

(17). $TXS_i = tx_i\,P_i\,X_i^S$

(18). $TXM_n = tm_n\,e\,P_n^{WM}\,M_n$

(19). $TXE_n = te_n\,P_n^E\,EX_n$

(20). $TMNI_i = tmi_i\,PC^{NW}{}_i\,(e.ICNCI_i)$

(21). $S_G = Y_G - PINDEX\,T_{GF} - CT_G - T_{GR} - \Sigma_h\,T_{GH\,h}$

A.3. DEMAND

(22). $CTH_h = YDH_h - SH_h$

(23). $CH_{hi} = MINI_{hi} + \beta_{hi}^C\,(CTH_h - \Sigma_j\,P_j^C\,MINI_{hj})\,/\,.P_i^C$

(24). $CG_i = \beta_i^G\,CT_G/P_i^C$

(25). $C_i = \Sigma_h\,CH_{hi} + CG_i$

(26). $INTD_i = \Sigma_j\,a_{ij}\,IC_j$

(27). $INV_{ki} = \beta_{ki}^I\,IT_k/P_i^C$

A.4. FOREIGN TRADE

(28). $X_n s = CET(EX_n, D_n; b_n^T, \delta_n^T, \rho_n^T)$
(29). $EX_n = CET^*(P_n^E/P_n^D, D_n; \sigma_n^T)$
(30). $Q_n = CES(D_n, M_n; b_n^s, \delta_n^s, \rho_n^s)$
(31). $Qad = Xad$
(32). $M_n = CES^*(P_n^M/P_n^D, D_n; \sigma_n^s)$
(33). $CAB = (1/e)T_{GR} + \sum_n P_n^{WM} M_n + \sum_i P^{NCW}{}_i ICNCI_i - \sum_h T_{RHh} - TRF - TRG - \sum_n P_n^{WE} EX_n$

A.5. PRICES
(34). $P_n = [(D_n/X_n^S) P_n^D + (EX_n/X_n^S) P_n^E] / (1+tx_i)$
(35). $P_n^{VA} = (P_n X_n^S - \sum_j P_j^C ICJ_{jn}) - PN^C{}_n ICNCI_n / VA_n$
(36). $P_n^M = (1+tm_n) e P_n^{WM}$
(37). $P_n^E = e P_n^{WE}/(1+te_n)$
(38). $R_n = (P_n^{va} VA_n - \sum_h W_h L_{ln}^D) / K_n$
(39). $P_n^C = (D_n/Q_n) P_n^D + (M_n/Q_n) P_n^M$
(40) $P_i^{CN} = (1+tmi_i) P_i^{CNW} e$
(41) $P_{ad}^C = P_{ad}$
(42). $Pindex = \sum_i \beta_i^X P_i$

A.6. EQUILIBRIUM CONDITION

(43). $IT_p = L_i^D + \sum SH_h + psS_F$
(44) $IT_g = (1-ps).\ SF + SG + e.\ CAB$
(45). $Q_i = C_i + INTD_i + \sum_k INV_{ki}$
(46). $L_{li}^S = U_{li} + \sum_i L_{li}^D$
(47) $u_i = U_{li} / L_{li}^S$

MODEL CLOSURE

B. ENDOGENOUS VARIABLES

	Number of endogenous variables
X_i^s : Branch i's production	15
VA_i : Branch i's value added	15
L_{li}^D : Branch i's labour demand by category l	30
Y_h^H: Total household income by h households	2
YK: Firm capital income	1
DIV_h: Dividend distributed to household h	2
S_h^H: Household savings	1
YD_H: Household disposable income	1
Y_F: Firm total income	1
S_F: Firm saving	1
Y_G : Government revenue	1
TXS_i: Indirect taxes	15
TXM_n: Revenue from import duties	14
TXE_n: Revenue from export tariffs	14
S_G: Government saving	1
CT_H : Total Household consumption	1
CH_{hi} : Household consumption of good i by h households	15
CG_i : Public consumption of good i	15
C_i : Consumption of good i (volume)	15
IT: Total investment (value)	1
INV_i: Consumption of good i for investment uses (volume)	15
IC_i : Totla intermediate consumption by branch	15
ICJ_{ij} : Intermediate Consumption of good j by branch i	225
$INTD_i$: Intermediate demand of good i (volume)	15
D_n: Local demand for domestically produced goods (volume)	14
EX_n: Export (FOB volume)	14
M_n: Imports (CIF volume)	14
Q_i: Domestic demand for composite good i	15
P_i: Producer Price	15
P_n^D: Price of domestically produced and consumed goods	14
P_i^C: Price of composite goods	15
P_n^{VA} : Value added price	14
P_n^E: Domestic price of exports	14
P_n^M: Domestic price of imports	14
R_n: Rate of return on capital in branch n	14

W_s: Wage rate by skill categories 2
CAB: Current account balance (in foreign prices) 1

C. EXOGENOUS VARIABLES

Number of

exogenous variables

K_n: Branch n's capital stock 14
L_l^S : Total labor supply of category l 2
P_n^{WM} : World price of imports (in foreign currency) 14
P_n^{WE} : World Price of Exports (in foreign curency) 14
PINDEX: Producer price index 1
CT_G: Total public consumption (value) 1
T_{GF}: Government transfer payments to firms (volume) 1
T_{RH} : Foreign transfer payments to households by category h 2
T_{FR}: Firms transfer payments to the rest of the world 1
e: Exchange rate (NRs per US dollar) 1

D. PARAMETERS

A_n: Cobb-Douglas scale coefficients
α_{ln}: Cobb-Douglas elasticities by labour categories
λ: Household share of capital income
dvr_h: Dividend rate of households h
mps: Household marginal propensity to save
ty_h: Household income tax rate by category of household h
tk: Capital income tax rate
tx_i: Indirect tax rate
tm_n: Import duty rate
tmi_i: Duty on intermediate imports
te_n: Export tax rate
β_i^G : Share of good i in public consumption
β_{ih}^C : Marginal share of good i household consumption by household group h
β_{ih}^{CA} : Average share of good i in household consumption by household group h
ε_{ih}: Income elasticities of good i by household category h
β_i^I : Share of good i in total investment
β_i^X: Branch i's share in total production
a_{ij} : Input-output coefficients
io_i: Leontief technical coefficients (domestic intermediate consumption)
noi_i: Leontief technical coefficients (intermediate imports)
v_i : Leontief technical coefficients (value added)
γ_{hl}: Share of labour income of category l by household h
ϕ_h: Share of household capital income

φ : Share of private investment
χ: Tax adjustment parameter
Frisch: Frisch Parameter
Mini: Subsistence level of consumption
η: Expenditure to supenumerary expenditure
ui: Unemployment rate in sector i
μ: Supply response to waiting unemployment
b_n^T : CET scale parameter
δ_n^T : CET distributive share
ρ_n^T : CET transformation parameter
σ_n^T : CET elasticity of transformation
b_n^s: CES scale parameter
δ_n^s : CES distributive share
ρ_n^s : CES substitution parameter
σ_n^s : CES elasticity of substitution

E. FUNCTIONS

CD: Cobb-Douglas function
CD*: Function derived from Cobb-Douglas
LF: Leontief function
LF*: Function derived from Leontief
CET: Constant elasticity of transformation
CET*: Function derived from CET
CES: Constant Elasticity of Substitution
CES*: Function derived from CES
LES: Linear Expenditure System

F. SETS

$i \in I = \{ N, ad \}$ All sectors

$n \in N =\{$ PAD, OFC, OCC, LFS, FOR,

MNQ, MFG, GEW, TRC, WRT, PSE, GSE: Commercial Sectors $\}$

AGR = { PAD, OFC, OCC, LFS, FOR}

AGR $\in$ N

ad: {GSE: Non-commercial sectors

E. The Impact of Tariff Reduction on Functional Income Distribution of Households: A CGE Model for Pakistan

THE IMPACT OF TARIFF REDUCTION ON FUNCTIONAL INCOME DISTRIBUTION OF HOUSEHOLDS: A CGE MODEL FOR PAKISTAN [1]

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[1]
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1. INTRODUCTION:

How the Structural Adjustment Program has affected the macro and micro economic indicators in developing countries? This is a critical question. The evidence so far is mixed. Among different liberalisation efforts Trade liberalization is an important component of Structural Adjustment Policies. It is expected to provide basis for the success of developing countries. As White(1997) for African countries shows that welfare indicators are expected to perform better in countries adopting adjustment policies than in those which do not.In late 1980s and during 1990s Pakistan liberalise imports in order to enhance the capacity utilization of the domestic industry, increase the efficiency and competitiveness of the production sector. The specific conditionalities of trade liberalization policies include, among others, cuts in tariffs and effective devaluation.

Reported statistics show that during 1980-90 Pakistan's growth performance was satisfactory, but a significant proportion of its population still lives in abject poverty. A number of studies, analyzing the impact of Structural Adjustment Policies (hereinafter SAP), have shown that the negative impact of these programs is unevenly distributed among the population, hurting the most vulnerable group the most. Kemal(1994), Amjad and Kemal(1997) and Anwar(1998) emphasize that SAP had an adverse effect on income distribution and poverty alleviation. This outcome is similar to the findings for Sub-Saharan Africa, former Soviet Union and Eastern Europe who experience decline in per capita income and worsening income distribution during the adjustment period (see Khan (1997).

Khan (1997) and Mahmood (1999) present a good analysis of trade liberalisation Policies and the resulting conditions necessary to improve income distribution and alleviate poverty in Pakistan. But Still there is a need of concrete method of analysis to take into account every aspect of the economy. Using SAM based multipliers, Iqbal and Siddiqui (1999) analyse change in income distribution under SAPs.4 They have shown that income distribution improves marginally in rural areas but worsen in urban areas of Pakistan due to fiscal policies opted under SAPs.5

In this study, we extend the SAM based analysis and develop a CGE framework to analyse the impact of SAPs in the economy of Pakistan. In developing countries, Computable General Equilibrium(CGE) models have been used for analyzing the medium to long term macro economic policies and counter factual analysis. Simulations based on CGE provide a useful tool for policy analysis. Many authors have

[3] However, there are some limitations of SAM based analysis (see Shoven and Whalley (1984) and Naqvi(1997).

[5] Only one study by Mahboobul Haq Center for Human development(1999) shows that poverty has declined over this period but that study has some methodological problem.

used CGE for policy analysis and counter factual analysis. For example Thorbecke(1991) for Indonesia, Janvry et al(1991) for Ecuador, Lambert and Schneider(1991) Cote d'Ivoire, Meller(1991) for Chille, Demery and Demery(1991) for Malaysia, Morrison (1991) for Morocco have used CGE frame work for the policy analysis. In Pakistan, few studies have used CGE model framework for the analysis of public policies.6 In this study we concentrate on the analysis of the impact of trade liberalization policies, particularly on the impact of tariff reduction on functional income distribution of households in Pakistan. There is a need to explore explicitly the outcome of these policies. The specific question to be answered in this study is: Do trade liberalization policies ease human lives by improving income distribution or not? To answer this question, simulation exercises are conducted to show the impact of these policies on functional income distribution of households and performance of the economy as a whole. The studies by Siddiqui and Iqbal(1999) and Iqbal and Siddiqui (1999) show that Poor segment of population receives higher proportion of its income from wages and salaries and the rich class receives highest share from capital income. Simulation exercise show how income and consumption of households change under these policies.

The plan of the paper is as follows: Second part presents historical view of trade policies, income distribution and poverty. Third part discuss (a)some theoretical aspects, (b) Characteristics of SAM, (c) main building blocks in CGE model. Results of simulations with alternate polices are discussed in fourth part. Final section outlines limitations, conclusions and future direction of work.

II. HISTORICAL VIEW OF TRADE POLICIES, POVERTY AND INCOME DISTRIBUTION IN PAKISTAN:

Under pressure from IMF and World Bank liberalization of Pakistan's economy is rapidly under way. The objective of trade liberalization is to gradually convert the economy from a relatively closed, inward looking with high tariff walls, insufficient import substituting industries and distorted prices, into a liberal and outward looking economy.

a. Policies Before Adjustment Period:

During seventies, Pakistan's economy relied more on indirect taxes (85% of tax revenue). The import taxes accounted for over half of this amount. At that time 41% of the domestic industrial output was protected by import restrictions. Pakistani government aimed to remove trade barriers and adopted

[6] Labus (1988), Iqbal (1996), Naqvi (1997), .

following policies.[7]

1) Removal of quotas on non-capital imports
2) Ban on 236 items have been removed during 1983 to 1986.
3) Import duty on capital goods were reduced from 40% to 30%.
4) Rebate of 50% on raw material if machinery was supplied to areas of partial or total exemptions.
5) Custom duty on different items was reduced i.e., on raw material from 50 to 40 % and then to 20 %, on textile from 60 to 40% and on some other items it was reduced from 80 to 40%. Duty on sugar was abolished.
6) A 5% surcharge on cif value of all imports and 5% of iqra surcharges were imposed on imports.
7) Structure of tariff has been changed as tariff on non competing machinery was removed at the same time tariff was increased on some other items like raw material and machinery.
8) The number of tariff slabs was reduced from 17 to 10.
9) 12.5 % sales tax was imposed. These changes resulted in reduction in un weighted tariff by almost 11% i.e., from 77% to 66%.
10) Import license fee was raised by 2 to 4 % of the cif value of imports.
11) Compensatory export rebates were abolished in 1986.
12) Flexible exchange rate was adopted in 1982 and in 1982-83 real effective exchange rate depreciated by almost 19%.

In spite of all these reforms nominal tariff rates still rank at the top. Pakistan still depends heavily on import bans and restrictions to protect its industry. Table 1 shows that exports as percentage of GDP has declined from 10.53% in 1981 to 7.99% in 1985 and in this period imports declined marginally from 19.25% to 18.95%. As a result deficit in trade balance increased from 8.72% to 10.96% and current account deficit increased from 3.69% to 5.4% of GDP. From 1985 to 1988 exports increased but imports declined and as a result trade deficit and current account deficit improve. During 1981-87 period trade deficit shows an increasing trend. The fundamental problem is that export growth prospects are adversely affected by the import substitution bias of the trade regime. The existence of anti export bias are obvious from the ratio of effective exchange rate of imports (EEXM) and exports (EEXE). This ratio increased from 1.75 to 1.86 during 1980-87, implying that as a result of devaluation decline in Pakistani export prices was relatively lower than the rise in import prices and as a result trade sector was biased in favor of import.8

[7] Different issues of Economic Surveys.

[8] EEXM: Effective exchange rate of imports
EEXE: Effective exchange rate of imports

Table 1: Historical trend in components of balance of payments in Pakistan.(as percentage of GAP)

YEAR	EXPORTS	IMPORTS	TRADE DEFICIT	EXCHANGE RATE	BALANCE OF PAYMENT
1981	10.53	19.25	8.72	9.91	3.69
1982	8.02	18.30	10.28	9.91	4.99
1983	9.39	18.68	9.29	12.71	1.80
1984	8.89	18.26	9.37	13.48	3.20
1985	7.99	18.95	10.96	15.15	5.39
1986	9.63	17.67	8.04	16.14	3.88
1987	11.06	16.14	5.08	17.18	2.16
1988	11.61	16.65	5.04	17.60	4.38
1989	11.64	17.56	5.92	19.22	4.83
1990	12.41	17.38	4.96	21.45	4.74
1991	13.47	16.74	3.27	22.42	4.77
1992	14.16	18.97	4.82	24.84	2.76
1993	13.18	19.24	6.05	25.96	7.14
1994	13.05	16.42	3.38	30.16	3.77
1995	13.34	17.04	3.70	30.85	4.07
1996	13.50	18.30	4.80	33.57	7.09
1997	13.49	19.29	5.80	38.99	6.24

Source: GOP,Economic Survey, 1997-98.

b. During Adjustment period:

The specific conditionalities for trade liberalization include cuts in tariffs and effective devaluation. In addition emphasis was also on the removal of non tariff barriers and their replacement by tariffs with the objective of reducing the number of banned commodity items. During 1988 to date Pakistan has adopted following policies:

1) Import surcharge was increased from 7 to 10 %.

2) Rate of custom duties was reduced from 40 % to 20 %.

3) Sales tax was levied by 12.5 %.

4) During 1992 maximum import duty was reduced from 125% to 90%. 5) Custom duty has been reduced from 90 to 80%.

Table 2 shows that following SAP Pakistan government has reduced maximum duty rate from Maximum duty rate of 250% in 1988 to 128% in 1990 and to 110% in 1995-96. On the other hand minimum duty rate has declined from 13.3% to 10% in 1990. Subsequently it declined to 0.5 in 1995-96. On the other hand average duty rate(un weighted) has declined from 40.7 to 25.5% during 1988-96.

Table 2: Historical pattern of tariff structure.

YEAR	TARIFF RATE(%)		
	MINIMUM	MAXIMUM	AVERAGE
1987-88	13.3	250.0	40.7
1988-89	16.1	155.2	36.0
1989-90	10.0	128.6	39.7
1990-91	12.6	151.2	39.0
1991-92	12.1	181.0	32.6
1992-93	17.7	270.1	35.3
1993-94	13.4	166.7	34.7
1994-95	0.3	128.6	21.6
1995-96	0.5	110.3	25.5

Source: CBR Year Book, 1995-96.

Recently, the number of duty slabs have been reduced from 13 to 5 with rates of 10%, 15%, 25%, 35%,and 45%.

The trade liberalization process of SAP is not very smooth, however it is expected to be beneficial for the country in the long run. If the country would be able to achieve efficiency and improved competitiveness by minimizing if not removing all distortions. After 1988 exports have been rising continuously while despite fluctuation overall imports also exhibit an increase from 16.65 to 19.24% during 1988-93. Table 3 shows that before 1988 growth rate decelerated while imports growth rate has accelerated. While after 1988 both has mixed trend (see table 3). This shows that despite all the efforts of Government of Pakistan, the external sector remained under pressure during last few years.

Fall in imports is attributable to the imposition of the condition of a 30% deposit in L/Cs (letter of credit), decline in oil prices, devaluation of the Pakistani Rupee and tight monetary policy which require a high liquidity ratio [see GOP (1993-94)]. During this period trade deficit remained almost constant while current account deficit increased from 4.4% to 6.24%(see table 1). This decline in part can be attributed to fall in remittances.

In 1982 Pakistan switched over from fixed exchange rate to floating exchange rate regime. Table 1 also shows that exchange rate has rising trend before and after adjustment period. But during the adjustment period it is almost doubled. Pakistan' export share in world exports declined from 0.17 % to 0.12% during 1972-82. After de linking Pakistan exports share in world exports increased from 0.12% to

0.20%(GOP, 1993-94). Since 1992 Pakistan's competitors have devalued their currencies and liberalized their exchange rate in order to be competitive. As a result Pakistani currency was devalued again in july 1993.

Table 3: Growth rates of exports and imports

Year	Exports	Imports
1983	31.11	14.57
1985	1.71	17.04
1988	23.82	21.77
1991	29.88	14.96
1993	3.08	12.51
1994	16.08	-0.15
1996	17.35	23.90

Furthermore, BOP crisis was aggravated due to restrictions on Pakistan after nuclear blast, Pakistan imposed restrictions on flow of foreign exchange resulting in further devaluation as exchange rate jumped from 46 Rs/Dollar to 57 Rs/Dollar (now it is about Rs51/ US $).

III. POVERTY AND INCOME DISTRIBUTION:

After almost a decade of start of Structural Adjustment Program, the important question is following: Whether SAP produced expected result of increased growth and equal income distribution in Pakistan. The following section will analyse growth and income distribution during the adjustment period. Documented statistics show that incidence of poverty and pattern of income distribution was better before adjustment as compare to the period thereafter. Income distribution has worsened in Pakistan particularly in urban areas during 1979 to 1994. Table 4 shows that Pakistan,s economy achieved a high growth rate of 6.4% in 1987-88. At that time Gini coefficient was 0.35 for the Pakistan as a whole and 0.31 and 0.37 respectively for the rural and urban areas of Pakistan. In the following year slower growth of real GDP was accompanied with rising inequality. Table 4 shows that GDP growth rate decline from 6.4 in 1988 to 2.27 in 1992-93. This slower growth was accompanied by rising income inequality. During this period Gini coefficients rose to 0.41 for Pakistan as a whole and to 0.37 and 0.42 for rural and urban areas respectively. Gini coefficients improve marginally in 1993-94 when GDP growth rate rose to 4.54 %.

Table 4: Trends of Gini Coefficients and Growth Rates of GDP.

	GINI COEFFICIENTS			Growth Rates		
Year	Pakistan	Rural	Urban	GAP	Imports	Exports
1987-88	0.35	0.31	0.37	6.44	21.77	23.82
1990-91	0.41	0.41	0.39	5.57	14.96	29.88
1992-93	0.41	0.37	0.42	2.27	12.51	3.09
1993-94	0.40	0.35	0.40	4.54	-0.15	16.08

Source: Pakistan Economic Survey, 1997-98.

During this period our exports and imports growth rates shows a declining trend. In 1987-88 Growth rate of imports and exports were 21.8% and 23.82% respectively. Growth rate of imports decline from 21.8% in 1987-88 to 14.96% in 1991-92. While growth rate of exports increased from 23% in 1987-88 to 29.9% in 1990-91, declined in 1992-93 to 3.1% for exports and to 12.5% import growth rate. In 1993-94 our imports growth rate was negative while our exports growth was 16.1%. In slow growth period 1988-1993, our trade sector also shows a decelerated trend except exports in (1990-91). In order to have a sustainable high economic growth, improvement are necessary in foreign trade performance which require sustained improvement in export expansion and efficient import substitution.

Table 5 shows before adjustment period poverty sharply went down from 30.7% to 17.32% population below poverty line when growth rate of GDP was around 6.2% (1984-1988). After 1988, during adjustment period it again has rising trend when GDP growth rate was 4.8% (during 1987-88 to 1997-98). This confirm negative correlation of growth and poverty. Same trend is found in rural and urban areas of Pakistan(see table 5).

Table 5: Trends in proportion of poor.

Year	Pakistan	Rural	Urban
1979	30.68	32.51	25.94
1984-85	24.47	25.87	21.17
1987-88	17.32	18.32	14.99
1990-91	22.11	23.59	18.64
1992-93	22.40	23.53	15.50

Source : Amjad and Kemal(1997).

World Bank(1995) presents some estimates of consumption poverty. According to these estimates consumption poverty reduced by 18.6% during 1985-88 period. Because growth and better income distribution helped to alleviate poverty. On the other hand during 1988-91 (slow growth period), Consumption poverty reduces by only 9.1% as income inequality shows rising trend in this period. Now the question is: whether the SAPs are responsible for this outcome, or we need more policies to complement trade liberalization policies.

III. a. THEORETICAL FRAME WORK FOR THE IMPACT OF TRADE LIBERALIZATION ON INCOME DISTRIBUTION:

All protectionist policies, i.e., over valued exchange rate, import control, and discrimination against exports resulted in inefficient use of resources. Economic theory suggest that the reduction of impediments to free trade would make the structure of production in LDC's more consistent with their comparative advantage than before. This would encourage expansion in production and exports of goods and services which could be produced at relatively low cost in terms of LDC resources and the replace by the imports of those goods and services which were costly in terms of LDC resource. As a result rate of growth would be higher due to improved efficiency of resource use. As comparative advantage promotes specialization in goods and services that use abundant resources i.e., labour, more intensively. This would increase the productive employment which is most effective and efficient instrument for poverty reduction. This hypotheses is confirmed by East Asian countries(Khan, 1997)9 Thus, integration with the global economy is also expected to improve the distribution of income and reduce poverty.

Import duties are intended to protect domestic industry, discourage consumption of luxury goods and stimulate development in the less developed countries. It ignores the gain from trade liberalization. Without liberalization high growth of export is even not possible as imported material and machinery is used in our trade able sector.

In principal, incentives are very important and economic agents do respond to them - provided demand is there for exports and local industry has the capacity to respond to export incentives. There are two ways of trade liberalization. First tariff reduction which increase efficiency and competitiveness among the producers. Second devaluation which raises the prices of imports. Prices play crucial role to affect our income distribution and poverty alleviation. According to Bourguignon et al (1991), there are three channels through which adjustment package affect income distribution. The first and more easily quantify able channel is changes in production incentives brought about by changes in relative prices

[9] There are some controversies about their development policies but still evolution of efficiency and equity out come of heir export oriented strategy of integration with the global economy has not been seriously challenged.

following changes in tariffs, other taxes and exchange rate.10 In this paper we concentrate only on the effects of tariff change on functional distribution of income. Phasing out tariff exemption will help the resource mobilization efforts. Effect of trade policy on resource allocation depends on the elasticity of supply of the product and the extent to which the change in trade policy affects domestic price. Higher elasticity of supply requires smaller adjustment in domestic price necessary to bring back equilibrium in the market. When we introduce imperfect substitution in CGE, impact of tariff reduction depends on the extent to which the imposition of tariff reduction affect the price of goods produced domestically.

Consider effect of tariff on imports and demand for domestically produced goods. Reduced tariff opens flood gate of imports. If domestically produced goods are substitutes of imported goods it will affect the price system. These policies have important implications for the economy as a whole. Reduction in tariff will reduce demand for domestically produced goods and increases demand for imports and reduced demand causes price decline of domestically produced goods.

Exchange rate management can also play an important role in improving the competitiveness of Pakistan's manufactured exports. Currency depreciation affect the rupee value of imports and hence quantity of goods imported and tax revenue. At given world prices Pakistan imports will declines a result of currency depreciation. A subsidy on exports will cause increase in foreign exchange earnings or not will depend on whether foreign elasticity of demand for our exports is greater than unity or less than unity. Similarly devaluation is equivalent to combining tariff on imports with a subsidy on exports at the same rate.

Clearly the impact of these polices will depend on whether the goods are complement or substitutes. The demand for the domestically produced goods is derived demand, because it enters the CES aggregation function. Export subsidy leading to increase in price is profitable for exporters. As a result it produces shortage of exportable good in the country resulting in increase in domestic prices that leads to increase in domestic supply. On the other hand this rise in price reduces demand for domestically produced goods entering in aggregate function and increase demand for imports.

Sectoral disaggregation allows us to capture the impact of policy change on sectoral demand and supplies. For example, changes in tariff rate and/or exchange rate affect the sectoral demand that are well captured through sectoral break down in general equilibrium models.

The mechanism by which policy changes affects functional distribution of income of households (income

[10] For the other two see Bourguignon(1991).

from different sources i.e., labour, capital, dividend etc) is the focus of the present study. There are three mechanism through which it is affected:11 first changes in factor rewards which directly affect households income. The distributional effect of changes in factor rewards are mitigated. Generally poor households supply labour services and receive highest share of their income from wages and Salaries as shown in Siddiqui and Iqbal(1999). While rich class receive higher percentage of their income from capital. These channels affects income distribution. Secondly, changes in relative product prices affect households' real income differently because consumption expenditure are specified at the household level. Thirdly households wealth distribution is affected by capital gains and losses. Imposition of tariff, improve terms of trade that will tend to increase real income.

We are interested in analyzing the impact of changes in incentives and resource allocation because they ultimately affect real income and welfare in the country. Households income distribution changes with the change in wages and salaries and also by changes in dividends(return on financial holding). On the other hand consumption also changes with change of income and prices. If we assume similar preference function for all consumers in the economy then we can compare the aggregate consumption with the consumption in the base line solution. If more of every single commodity is consumed after policy shock that indicates improvement.

III (b). SAM BASED OPEN ECONOMY CGE MODEL FOR PAKISTAN:

(With Government Sector)

It is widely accepted that because of the sensitivity of domestic resource allocation for developments in the external sectors the issue of foreign trade is particularly well suited for general equilibrium analysis. In this framework we can make comparison of outcome of ultimate policies which help to determine the optimal policies leading to a better outcome than any other12. Every economy wide model, particularly CGE model requires a consistent data base and the data arranged in SAM format provides the best consistent data base. This open economy model including government account for Pakistan is calibrated using Social Accounting Matrix (SAM) for Pakistan for the year 1989-90. Base values are same as in the SAM 1989-90.

Social Accounting Matrix for 1989-90 disaggregates production activities into five sectors; agriculture,

[11] Bourguignon et al(1991, pp1535)

[12] For Surveys of these CGE models, see Shoven and Whalley(1984). In addition see, Melo(1988), Tylor(1988), Robinson(1990) for developing countries models.

Industry, education, health and others.13 These commodities are then transformed into traded goods, i.e., exportable(EXi) and non traded goods, i.e., goods for the domestic market(D). Similarly, factors of production are disaggregated into labour and capital. Four type of institutions are identified; households, firms, government and rest of the world.14 In accordance with the orientation of analytical interest and policy problems related with the field of distribution of income and consumption, classifications of the SAM's(in the present form) are as to high light the income receipt pattern of household(aggregate) from different sources and their uses. As mentioned earlier, In this paper we limit our analysis to see the impact of tariff reduction on income of households from different sources and on household consumption. For the present analysis we assume consumption of agriculture commodities as food consumption. Which we assume are basically food items, manufactured commodities includes basic items durables. In addition it shows expenditure on education and health separately. Rest are included in the others sector. Second institution is firms which receive income from retained gross profits and from government transfers. Firm transfer this income in form of dividends to households and to rest of the world. In addition it pays taxes. Rest is saved. Government institution's income account collects direct and indirect taxes, import and export duties from institutions, production, and trade sector respectively. This income is used for public consumption and a part of this revenue is transferred to households and to firms. Aggregate capital accounts collect savings from all the four institutions i.e., households, firms, government, and rest of the world. This aggregate saving is used to finance investment.

The computable general equilibrium model of Pakistan economy is a structural economy wide multi sectoral model. Equations in this model are set in simplified version.

III c. BLOCKS IN CGE:

Production Sector:

Domestic production is disaggregated into five sectors of production. Like many other authors we adopt a technology in which gross out put is separable in production function for value added and intermediate.

[13] Further disaggregation would be on the basis of food items and non food items.

[14] We distinguished household group in our earlier study(Siddiqui and Iqbal,1999) into four income groups for rural and urban areas of Pakistan separately. This disaggregation is carried out to make an example how SAM matrix, and the related CGE model can combine the macro economic features with microeconomic issues. Although the disaggregation of household sector is of much importance to see the impact on income distribution. But in this paper we just keep the household sector aggregate formate.

With Cobb Douglas production function for value added and leontief technology between intermediate and value added and also within intermediates. Equations for gross out put(X), value added(VA), and intermediate consumption(IC) are specified equations 1 to 4.

(1)

$$X_i^s = LF(L, K, IC_i, io, v_i)$$

(2)

$$VA_i = CD(K_i, L_i^D,; A, \alpha_i)$$

Where is i sector of production.

(3)

$$IC_i = LF^*(X_i^s)$$

Intermediate demand of good i for producing good j

(4)

$$IC_{ij} = a_{ij} IC_j$$

Labour Demand:

Assuming perfect competition, labour demand function for ith sector is derived from Cobb Douglas production function as follows:

(5)

$$L_i^D = CD^*(P_i^{va} / W, VA_i)$$

in which labour is paid equal to their marginal product. Where W is the average wage rate and Pvai is value added price which is defined in equation 35. Capital is assumed to be given in the short run. Rate of return to capital is determined by the following equation.

(6)

$$R_i = (P_i^{VA} * VA_i - W * L_i^D) / \overline{K_i}$$

Labour market is cleared as follows:

(7)

$$\sum L^{D_i} = \overline{Ls}_1$$

Ls is the supply of labour services.

Intermediate demand for composite intermediate input is derived from sectoral production levels and the input-output coefficients.

(8)

$$ID = \sum a_{ij} IC_j$$

Trade Sector: In this sector we have equations for exports and imports. Equation 9 is a constant elasticity of transformation (CET) function which gives the function to transform output into goods for domestic market and for export market. In this specification we assume that domestic sales and exports with the same sectoral classification represent goods of different qualities. CET function describe the ease with which it is possible to shift the composition of sectoral production between the domestic and external markets. We specified this function as follows:

(9)

$$X_n^s = CET(EX_n, D_n)$$

For imports we assume that domestically produced goods sold in domestic markets are imperfect substitute of imports(Armington assumption). Equation 10 present constant elasticity of substitution (CES) import aggregation function which presents demand for composite good n (imported and domestically produced goods). Equation 10 shows that consumer demand for the combination of imported and domestically produced goods.

(10)

$$Q_n = CES(D_n, M_n)$$

In addition to equations 9 and 10 for export transformation and import aggregation respectively, profit maximization together with cost minimization gives desired exports and imports ratio as function of relative prices (domestic to foreign prices). These function are presented by equations 11 and 12. Where output prices and composite price are given in equations 34 and 38 respectively.

Equation 11 is export supply function of commodity n. It is function of relative prices; export price, and domestic price. Export price is determined by the equation 37.

(11)

$$EX_n = CET^*(P_n^E, P_n^D, D_n)$$

While equation 12 presents import demand function. It depends on the domestic prices as well as on import prices. In equation they appear in relative terms. Where price of imports is defined in equation 36.

(12)

$$M_n = CES^*(P_M, P_n^D, D_n)$$

Domestic demand for non trade(nt) good is equal to its supply.

(13)

$$Q_{nt} = X_{nt}$$

its price is defined in equation 39.

Foreign exchange market clearing can be formulated through Balance of payment equilibrium which is defined as follows in foreign currency.

Model is closed in the balance of payment equation.

(14)

$$\sum P_n^{WM} * M_n + (1/e) T_{FR} - \sum P_n^{WE} * EX_n - TR_H - TR_G = \overline{CAB}$$

Where CAB is exogenously determined and it enters in identity of investment equal to savings. It appears on the saving side to show the availability of this fund for investment. Exchange rate would be the equiliberating variable.

TFr is transfers from firms to the rest of the world and TRh and TRg are the transfers to the households and to the government from rest of the world.

Income and Saving

Household income: In this study we are doing the analysis of functional distribution of income to households. Households receive income from different sources. The institutions income from rental values of primary factor are determined by their endowment of primary factors and prices of theses factors. All wage income accrues to households i.e., W*sum(Ldi). Household also receive share of capital income (lambda) from total capital income from different activities. Dividends(DIV) from capital income of firms, transfers from government as social security benefits (TRg), and transfers from the rest of the world(TRh) to the households, remittances. Equation 15 presents total income of households from above mentioned sources. Dividends are determined by equation 16. Transfers from the government and from the rest of the world are exogenously determined.

(15)

$$Y_H = W \sum L_i^D + \lambda \sum R_n K_n + DIVh + e * TR_H + Pindex * TR_G$$

(16)

$$DIVh = dvr\,YF_K$$

Allocation of household income is as follows:

Households pay taxes to Government. So subtracting taxes from the total income we get disposable income of households which is used for consumption and saving purposes.

Households saving is defined as follows:

(17)

$$YD_H = (1 - t_y)\,Y_H$$

Where Sh is households saving and mps is marginal propensity to save and YDh is disposable income.

Total consumption(CTH) and consumption of commodity i(CHi) of households are defined by equations 19 and 20 respectively. These equations describe the demand for ith good by households. Equation 20 describe how total consumption expenditure(CTh) is allocated among different goods. Where total consumption expenditure is defined as follows:

(18)

$$CT_H = YD_H - S_H$$

CHi is commodity consumption by the households Bci is fixed value share of good i with sum of Bci is equal to 1.

(19)

$$CH_i = \beta_i^c * CT_H / P_i^c$$

Firms receive income from retained profits and in terms of transfers from government.

(20)

$$YF_K = (1 - \lambda)\Sigma(R_n K_n)$$

(21)

$$Y_F = YF_K + Pindex\, T_{GF}$$

Where Tgf is transfers of government to firms.

Firms pays taxes to government TDk. It pays dividends to households and to the rest of the world and rest is saved. Saving of firms can be defined as follows:

(22)

$$S_F = Y_F - tk * YK - \div - TF_R$$

Third institution government receive income from the following sources:

1) Direct taxes(income tax(ty*YH), corporate taxes(tk*TFK)

2) Indirect taxes (TXSi)

3) Import duties(TXMi)

4) Export duties(TXEi)

5) transfers from rest of the world (TRg)

which are specified as follows:

(23)

$$TXS_i = tx_i * P_i * X_i^s$$

So total government revenue is:

(24)

$$Y_G = ty * Y_H + tk * YK + \sum TXS_i + e * T_{RG} + \sum TXM_n + \sum TXE_n$$

Where

(25)

$$TXM_n = tm_n * e * P_n^{WM} M_n$$

(26)

$$TXE_n = te_n * P_n^E EX_n$$

Government total current expenditure is given as

(27)

$$CT_G = \overline{CT_G}$$

And government current expenditure on commodity i is fixed volume share calculated as follows:
(28)

$$CG_i = \beta_i CT_G / P_i^c$$

Government saving is calculated as residual after consumption expenditure.

(29)

$$S_g = Y_G - Pindex * T_{GF} - Pindex * T_{GH} - CT_G$$

Total consumption expenditure on good i is sum of the expenditure by households on good i and by government on good i.

In addition to consumption expenditure there is demand for good i for the investment purposes. Equation

24 converts aggregate investment into demands for investment good by sector of origin. Investment in ith sector is calculated as follows.

(30)

$$I_i = \beta_i^I * TI / P_i^c$$

Consumption of Good i for gross investment. TI is gross capital formation in commodity i,Bi fixed value share, sum of shares is equal to one. Saving and other sources of funds for gross investment are from households, institutions.

Capital market equilibrium is attained as follows:
Gross investment is equal to gross saving.

Prices

There are seven prices associated with each tradeable good, price of aggregate output, price of composite goods(Pc), price of domestic sale(Pd), domestic price of imports, domestic price of exports, world price of imports and world price of exports. We define all these prices as follows:

Producer price:
(31)

$$P_i(1 + tx_i) * X_i^s = D_i * P_i^D + (EX_n) * P_n^E$$

Price of value added:

(32)

$$P_i^{VA} = (P_i X_i - \Sigma(P_j^c IC_{ji}) / VA_n$$

Import price and export prices are linked with world price of imports and exports which are assumed to be fixed these equations. Equation for imports and exports are as follows.

(33)

$$P_n^M = (1 + Tm_n)e * P_n^{WM}$$

Import price

Export price

(33)

$$P_n^E = e\,P_n^{WE} / (1 + te_n)$$

Price of composite good of tradable

Composite commodity price for non tradable

(35)

$$P_{nt}^c = P_{nt}$$

Pindex is producer prices index:

$$Pindex = \Sigma(beat_i^x * P_i$$

PWEn= World price of exports
PWMn= World price of imports

Equilibrium condition in the market for domestically produced goods in sector i is according to Walras law when n-1 markets are in equilibrium, nth market is equilibrium too.

The number of equations in the model are equal to number of endogenous variables.

VI. SIMULATIONS USING TARIFF REDUCTION:

The results of CGE models present the different macroeconomic scenario of alternative policies. In order to assess the effects of these alternate policies. we analyse the deviation of the different variables from the base line values. Base line solutions are the values of original SAM values.

CGE model based on the assumption on the exogenous accounts.
The basic assumptions are:

1) Total labour supply is equal to labour demand.
2) Total amount of capital is given and its allocation to alternative activities depends on the its relative price.
3) Government consumption is fixed in terms of quantity of
publicly consumed goods. Its value depends on prices and disposable government revenue.
4) Households remittances and transfers from government are fixed.
5) Current Account is exogenously determined.

Under these assumptions, This CGE model is used to perform three simulations exercises by reducing tariff rate. In the experiment we assume that the Government introduces tariff reduction to change the import inflow. This measure aims to increase the competitiveness in the economy. This will lead to increase the efficiency of the production sector and put the resource in their best use. In first, second and third exercise we reduce tariff rate by 30%, 50% and 80 % respectively.

The main objective of the study is to analyses functional distribution and resource allocation effects of tariff rate reduction. The tariff rate change lead to the changes in relative output and factor prices that lead to change of producer prices. As a result of these changes resources move across the sectors and change resource allocation. On the other hand changes in the relative prices affect income of the households from different sources. Due to change in price and income consumption pattern of households also changes. The simulations results are shown in tables A1 to A5 which are given in the end.

Table 1 presents the changes in income from different sources and consumption of different commodities by households. Table A1 shows that income from wages and salaries increases by 0.92%, 1.59%, and by 2.65% respectively over the base value. At the same time income from dividends also increase by 2.63%, 3.36%, and 4.51% in three simulation exercises. This resulted in total households income increase by 1.95%, 2.61%, and by 4.51% in the three simulations exercises respectively. This result shows that percentage increase in households income from dividends are greater than the percentage increase in wages and salaries. Disaggregation of the household sector will be useful to see the exact impact on income of rich and poor. But still we can draw some conclusion from this result. The SAM 1989-90(Siddiqui and Iqbal) shows that the highest share of income from wages and salaries accrue to the poor households while highest share of income from dividends goes to the rich households. From this we can infer that reduction in tariff benefits more to the rich class. Households consumption changes due to change in price as well as changes in income. Table A1 also presents the percentage change of consumption of different commodities from the base value. It shows that consumption of all traded goods has increased due to income effect and price effects. As tariff reduces the price of import which reduces the price of composite good that result in increase in consumption of these commodities. On the other hand as income increase the consumption also increase. It shows the highest increase in consumption of manufactured goods and lowest increase in consumption of agriculture product. This can be analyses in this way that an increase in income is greater in the high income group. This increase led to an increase in the consumption of the items other than food. So consumption of non food items increase more as compare to food items.

Table A2 shows that labour demand increases in agriculture, health and others sectors but declines in industry and education sector. So it remains inconclusive that employment level will increase or it will just change the sector of employment.

The results on factor prices are presented in table A3. These tables help to explain change in income from different sources as mentioned above. This table shows percentage change wages and returns to capital in each sector i.e., agriculture, industry, health, others and education. The table shows that returns to labor(aggregate) increases from 0.92, 1.59% to 2.65% as tariff rate reduces from 70% to 20% of original vale. A study by Siddiqui and Zafar(1999) shows that lower income group is heavily dependent on wage income, thus an increase in wages will affect the poor segment of population more. This study also shows that 24.4% and 51.2% of wages accrue to lowest income group in rural and urban areas of Pakistan i.e.,43.1% and 59.8% households in urban and rural areas. On the other hand returns to capital increases in all the sectors and it increases as reduction in tariff increase in all sectors but industry. In industry returns to capital decline as tariff reduction increases. Table clearly shows that price of capital increase more as compare to wages to labor. The above mentioned study also shows that 28.6% of total capital income in urban areas and 22.40 % of capital income accrue to the rich class which constitute a very small percentage of households i.e., 8.2% and 4.5% in urban and rural areas of Pakistan. As Price of capital increase it increase Total profit from capital. Firms income from it also increases. In result households receive transfers from firms, dividends, also increases. This implies that tariff reduction benefits more to the rich class. Thus, we can infer that tariff reduction will adversely affect the income distribution in Pakistan.

Table A4 and A5 present the percentage change in sectoral output and price respectively. Table A4 shows that output increases in all sectors but not in industry and in education. While table A2 shows that labor demand in agriculture, health, and in others sectors increase but it declines in industrial sector and in education sector. All this shows that resources shift or efficiently be used in agriculture, health and others sectors. Table A5 shows output price effect. It shows producer price decline for industrial output but increase for all other four products. Tariff reduction opens the flood gate of imports and our industrial sector can not compete if it did not improve quality because due to sub standard quality and it will loss competitiveness.

As tariff rate is reduced prices of composite goods decline it will intend to increase the demand for imports. If our industry can not compete than our imports will overwhelm our economy. That will not be beneficial for the country as a whole.

Limitations, Conclusion and future extension of work:

We attempted to analyse one of the major trade liberalisation policies of Structural Adjustment reforms, tariff rate reduction, on functional income distribution to households in Pakistan through CGE modelling that is well know for this type of analysis. Using SAM-based CGE model, simulation exercises are performed to describe the impact of adjustment policy, reduction in tariff rate by 30% , 50% and 80%. The main conclusions are as follows.

The results show the impact on income of households through change in factor prices. It shows income of households increase through increase in wages and increase in dividends. But percentage increase in income is greater from dividends as compare to increase from wages that implies that income distribution is getting worse. As we know that higher percentage of income from dividends goes to rich and higher percentage of wages and salaries goes to poor segment of population. This implies that income distribution is getting worse as a result of this policy change. Indeed the analysis with disaggregate households sector will give the true picture.

Consumption of non food items increase more as compare to food items. Firstly price of industrial goods declines. While prices for other goods increase. Second income for rich segment of population increase with higher percentage.

Limitations:

This paper is just an exercise to understand the whole mechanism of CGE models and the channels affecting income and expenditure of households and economy as whole. It shows just the direction of change in various variables as a result of policy change, i.e., tariff reduction.

Secondly our findings are limited as in this attempt single household sector was under consideration.Comprehensive analysis would only be possible with the disaggregation of household sector. Although efforts are under way to run model with disaggregated household sector.Further analysis will be conducted with four income groups for rural and urban areas of Pakistan with some modification in the model.

Extension of the work:

1) Extension and improvement of the SAM: Classification would be the disaggregation of the aggregate labor account by employment status or by occupation of earners. We plan to disaggregate labor by occupation groups i.e., professional, administrative workers, clerical and related workers etc.

2) The simplest method to evaluate income distribution is the size distribution of income which compares the share in income of different socio economic groups. Next study will be on distributional impact of these polices across the households for rural and urban areas of Pakistan.

Table A1: Percentage Change in income and expenditure of households due reduction in tariff rate.

Variables	Simulation 1	simulation 2	simulation 3
Income			
Wage and Salaries	0.92	1.59	2.65
Dividends	2.63	3.36	4.51
Total Income	1.95	2.61	3.65
Expenditure			
Agriculture	0.99	1.34	1.88
Industry	4.39	6.80	10.76
Health	1.48	1.93	2.64
Others	1.82	2.21	2.82
Education(nt)	0.0	0	0.0
Saving	1.95	2.61	3.65

Not : nt ..non traded

Table A2: Changes in labour demand in production sector due to tariff reduction

Production sectors	SIMULATIONS		
	1	2	3
Agriculture	1.25	1.34	1.48
Industry	-1.87	-2.90	-4.51
Health	1.11	1.40	1.85
Others	0.29	0.76	1.49
Education	-0.32	-0.74	-1.39

Table A3: Percentage change in Price of inputs.

	SIMULATIONS		
Production sectors	1	2	3
Agriculture	2.18	2.96	0.32
Industry	3.52	3.11	-1.34
Health	2.04	3.02	0.88
Others	2.58	3.75	0.41
Education	0.66	0.90	1.28
Wages	0.92	1.59	2.65

Table A4. Out put effect due to tariff reduction.

Production sectors	Simulations		
	1	2	3
Agriculture	0.27	0.29	0.32
Industry	-0.55	-0.86	-1.34
Health	0.53	0.66	0.88
Others	0.08	0.21	0.41
Education	-0.26	-0.59	-1.11

Table A5: Output Price effect.

	SIMULATIONS		
Production sectors	1	2	3
Agriculture	1.05	1.42	1.99
Industry	-0.75	-1.23	-1.98
Health	0.48	0.68	1.0
Others	0.13	0.39	0.80
Education	0.73	1.24	2.0

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F. Philippine Trade Reforms: An Economy-wide Analysis

Philippine Trade Reforms: An Economy-Wide Analysis

Caesar B. Cororaton

Introduction

The Philippine government has been very aggressive in implementing its trade reform program (TRP). In general, the TRP consisted of three major parts (a) "tariffication" of quantitative restrictions; (b) simplification of the tariff rate structure[1], and (c) reduction in tariff protection. The overriding concern of the TRP is to promote production efficiency, as well as to promote international competitiveness of local products. The objective of this paper is to analyze the effects of the TRP using an economy-wide model of the Philippine economy. In particular, the paper seeks to examine the resource allocation and income distribution effects. Furthermore, using a household model on food demand, the paper extends the analysis to examine the effects on food availability at the household level, in particular calorie and protein availability.

Review of Related Literature

Tariff Rate Changes. A number of papers have looked into the effects of the TRP. In a recent paper, Manasan and Querubin (1997) analyzed the impact of the different trade and tariff reform programs which took effect in the 1990s, the period when the implementation of the TRP was intensified because of the AFTA, WTO and unilateral programs, on tariff simplification and international competitiveness[2]. In particular, they computed implicit tariff rates and effective rates of protection (EPRs) for 169 commodities based on domestic and border prices. The study found that as a result of the TRP, significant achievements were achieved in the area of tariff simplification. Overtime, the program restructured the tariff system from a five-level rate schedule to a three-

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[1] This refers to the narrowing of the range of the tariff rate structure.

[2] AFTA means ASEAN Free Trade Area, while WTO World Trade Organization.

level rate schedule. Moreover, most of the commodities cluster around the 3-20 percent range.

Furthermore, based on the results, they observe gains in the form of reduction in the average nominal and implicit tariff rates, as well as in the EPRs over the 1990-2000 period. Overall, the average nominal tariff rate decreases from 33.3 percent in 1990 to 19.5 percent in 2000. Likewise, the average implicit rate based on price comparison declines from 28.6 percent in 1990 to 16.8 percent in 2000. In addition, the overall EPR based on price comparison drops from 29.4 percent in 1990 to 18.0 at the turn of the century.

It was also observed that the decline in the EPRs is more pronounced for the manufacturing group than for the primary group, particularly the agriculture sub-group. This implies a switch-over in relative protection in agriculture and manufacturing sectors. Relative protection is observed to be increasing from 1995 to 2000, in sharp contrast to the previous decades when the agricultural sector was penalized heavily relative to the manufacturing sector. During the period 1990-1994, the manufacturing group enjoyed relatively higher protection than agriculture. There is a major switch during the period 1995-2000 in favor of agriculture.

Macroeconomic Simulations. There are a number of simulation results derived using different models analyzing some of the developments and reforms that had taken place in the trade sector. Some of the tariff rate changes analyzed are actual changes, while some are "analytical" changes. The former attempts to understand the actual effects of the actual changes, while the latter tries to understand the likely effects of some of the tariff changes programmed to be implemented in the future.

Yap (1997) simulated changes in tariff from 1993 to 1996 using the PIDS macroeconometric model. His results indicate an overall increase in output of the economy as a result of the decline in the average tariff rate. In terms of sectoral output effects, output indicators of all major sectors show improvements. However, there are differentiated effects across major sectors, with the industrial sector benefiting the most and agricultural sector the least during the simulation period.

In another paper Yap (1997) conducted a set of simulations concerning across-the-board uniform tariff of five percent using a smaller macroeconometric model based on a three-gap framework. In particular, the average tariff rate is programmed to decline toward five percent by the year 2004. The results indicate a greater demand for imports which leads to worsening of the trade deficit. This effect in turn puts pressure on the exchange rate. However, the increase in the volume of imports does not compensate for the reduction in the tariff level, and as such, does lead to a deterioration in the fiscal balance. In general, the implication of the analysis is that tariff reduction makes macroeconomic constraints more restrictive, which leads to an unambiguous fall in investment and, consequently, in a lower growth rate.

However, using a partial equilibrium, trade model based on input-output framework, Tan (1997) found that the five percent uniform tariff has favorable effects. Output can increase from the trade reform and from the five percent uniform tariff as resource allocation improves within the tradable sector due to changes in relative prices. Further simulations show that a much lower uniform tariff (say three percent) translates to a potentially higher growth in output and income. The growth rate for the manufacturing sector is highest, while the decrease in output is least for agriculture. Additional insights from the simulation results indicate that a much higher uniform tariff rate results in a greater rate by which the output of agriculture will fall.

Cororaton (1995) conducted few simulations concerning changes in the sectoral nominal and implicit tariff rates from 1988 to 1992 using the APEX (1992) model, a computable general equilibrium model of the Philippine economy. The results indicate an increase in GDP of 0.47 percent. There is a marginal increase in inflation of 0.04 percent. However, the increase in GDP is accompanied by a 0.11 percent increase in the current account deficit, as the increase in exports surpasses the increase in imports. However, when the exchange rate was adjusted to bring back the external sector in balance, the annual average growth of GDP is reduced to 0.44 percent. This is the effect of a much higher impact on prices as a result of the adjustment in the exchange rate.

In another paper, Cororaton (1997) conducted another round of simulations concerning tariff changes within two different exchange rate regimes, fixed and flexible exchange rates, using a financial computable general equilibrium (FCGE) model of the Philippine economy constructed by Jemio and Vos (1993). One of the major results indicate that changes in tariff within a flexible exchange rate would have the biggest effect in terms of GDP growth. That is, a tariff reduction program implemented within a flexible exchange rate regime has the biggest positive effect on output. However, the effect on income is marginal, particularly income distribution.

Yap (1997) extended his paper to capture the income distribution effects of the tariff change from 1993 to 1996 by extending his macroeconometric model with an income distribution sub-model. The income sub-model is driven by the sectoral gross value added results of the main macro model. The income distribution effects as indicated by the Gini Ratio shows a deterioration in income distribution. This is because the increase in industrial output is far greater than the increase in agricultural output. Since households in the lower income brackets in the Philippines heavily depend on the agricultural sector, the relatively slower growth in agriculture generates unfavorable income distribution effects.

Cororaton (1995) generated some income distribution simulation results concerning tariff changes from 1988 and 1992 using the same APEX model. The results indicate some progressivity in the tariff change during the period, i.e., households in the lowest income group enjoy the highest increase in income compared to the highest income group. The progressivity in the tariff change is more pronounced in the results on households labor income. These results hold for both fixed and flexible exchange rates.

Furthermore, the progressiveness of the tariff change can be tied up with the results on prices of unskilled labor, skilled labor, and the price of variable capital. For both fixed and flexible exchange rate regimes, unskilled labor gets the highest increase in wages. Unskilled labor usually belongs to the poorest segment of the population. Furthermore, the price of capital increases a lot faster than the general price of labor. Since substitution between labor and capital is allowed in the model, the higher increase in the price of capital relative to the price of labor results in some kind of a substitution effect in favor of labor. This effect partly explains the favorable income distribution effects.

There is only one paper available which looks at the household effects of the tariff change. Using a linking matrix which ties up the CGE results on sectoral prices and household incomes with a system household demand for food model, Orbeta and Alba (1996) quantified the calorie and protein availability effects of different household types as a result of the tariff changes between 1988 and 1992. In particular, they utilized the results of the APEX model simulations on sectoral prices and household incomes concerning the said tariff change between these two years. Their results indicate lowering of prices, except for prices for beverage. The income change, on the other hand, shows progressive effects as lower income households receive higher income increase compared to the higher income households.

As a result of the decline in prices, household increase their demand for most of the food items except for the highest income quintile where only the demand for cereal, fish and other food increase. Furthermore, they translated these effects into changes in calorie and protein availability in households. The results indicate that the 1988-1992 tariff reform program was not only progressive in terms of income, but also equally progressive in terms of macro nutrient availability in households. In particular, lower income households are shown to have greater increase in both calorie and protein availability.

Trade Reforms

Before 1990s. There were a number of trade programs implemented before the 1990s but the major one started in 1980. The program had three major components: the 1981-1985 Tariff Reform Program (TRP); the Import Liberalization Program (ILP); and the complimentary realignment of the indirect taxes. In TRP, there was a narrowing of the tariff rate structure from a range of 100 - 0 percent to 50 - 10 percent. During the period 1983-1985 sales taxes on imports and locally produced goods were equalized. Also, the mark-up applied on the value of imports (for sales tax valuation) was reduced and eventually eliminated.

However, because of the balance of payments crisis during the mid-1980s the import liberalization program got derailed. In fact, during the crisis some of the items which were deregulated earlier were re-regulated.

When the Aquino government took over in 1986, the trade reform program of the early 1980s was resumed. In fact, the number of regulated items was reduced from 1,802 in 1985 to 609 in 1988. Furthermore, export taxes on all products except logs were abolished.

Within 1990s. Table (1) summarizes the trade reform program during the 1990s. The government launched a major reform program in 1991 with the issuance of the Executive Order (EO) 470 (also called the TRP-II, an extension of the previous trade reform program). Under this program, tariff rates were realigned over a five-year period. The realignment involved the narrowing of the tariff rate range through a series of reduction of the number of commodity lines with high tariffs and an increase in the commodity lines with low tariffs. In particular, the program was aimed at clustering the commodities with tariffs within the 10 - 30 tariff rate range by 1995. Despite the programmed narrowing of the tariff range, about 10 percent of the total number of commodity lines were still subjected to 0 - 5 percent tariff and 50 percent tariff rates by the end of the program in 1995.

"Tariffication" of QRs started in 1992 with the implementation of EO 8. There were 153 commodities whose QRs were converted into tariff equivalent rates. Also, under the same EO, tariff rates on 48 commodities were further re-aligned. EO 8 raised the tariff rates applicable to the relevant commodities by 100 percent of their pre-EO 8 levels. In effect, the tariff rates imposed were higher than the tariff equivalent rates in a number of cases, especially during the initial years of the conversion. However, EO 8 has a built-in program for a five-year phase-down of the "tariffied" rates.

Under the import liberalization program, de-regulation continued on 286 items. By the end of 1992, only 164 commodities were covered under the QRs. However, the implementation of the Memorandum Order (MO) 95 in 1993 reversed the de-regulation process. In fact, QRs were re-imposed on 93 items, bringing up the number of regulated items under the QR to 257. This re-regulation came largely as the result of the Magna Carta for Small Farmers in 1991.

Major reforms were implemented under the TRP-III. The program embodied in the following EOs: (i) EO 189 implemented in January 1, 1994 which provided reduced tariff rates on capital equipment and machinery; (ii) EO 204 in September 30, 1994 which mandated tariff reduction in textiles, garments, and chemical inputs; (iii) EO 264 in July 22, 1995 which reduced tariffs on 4,142 harmonized lines in the manufacturing sector; and (iv) EO 288 in January 1, 1996 which reduced tariffs on "non-sensitive" components of the agricultural sector. The restructuring of tariff under these EOs refers to a reduction in the number of tariff tiers and the maximum tariff rates. In particular, the program was aimed at establishing a four-tier tariff schedule: 3 percent for raw materials and capital equipment which are not available locally; 10 percent for raw materials and capital equipment that are available from local sources; 20 percent for intermediate goods; and 30 percent for finished goods.

Another major tariff program which is in the pipeline and is likely to be implemented starting 2004 is the uniform tariff rate. At the moment, debate is still ongoing as to the possible effects of this tariff program and at what rate will the tariff be made uniform across sectors. Suggestion of five percent has been put forward.

Model Structure

1. Economy-Wide Model

The economy-wide model has 34 production sectors. It has 10 household types (decile). The other institutions in the model are un-incorporated enterprises, private sector, and government. The model was calibrated using the official 1990 social accounting matrix (SAM) of the Philippine economy.

Import Sector. The model uses the standard armington assumption to capture imperfect substitutability between imports (IMP_i) and domestically produced goods ($DOMSS_i$). Thus, if domestic consumers are assumed to have a CES utility function over the two types of goods, then this assumption leads to the following equation

(1) $$X_i = A^c{}_i\{\delta_I\ IMP_i{}^{-\rho i} + (1-\delta_i)\ DOMSS_i{}^{-\rho i}\}^{(-1/\rho i)}$$

where X_i is called the "composite" commodity. Greek letters in this equation and in the rest of the equations are parameters.

Minimizing the total cost

(2) $$P_i*X_i = PD_i*DOMSS_i + PM_i*IMP_i$$

subject to (1) yields the first order conditions

(3) $$IMP_i/DOMSS_i = \{(PD_i/PM_i)*(\ \delta_i/(1-\delta_i))\}^{\sigma i}$$

where $\sigma_i = 1/(1+\rho_i)$ is the trade substitution elasticity.

From (3) the consumers will choose a combination of IMP_i and $DOMSS_i$ depending upon their relative prices; domestic price, PM_i, and domestic price of imports, PM_i.

The domestic price of imports is linked with the world price of imports (PWM_i) through the following relationship

(4) $$PM_i = PWM_i*(1+TM_i)*ER$$

where ER is the exchange rate and TM_i is the import tariff rate. In the system of equations, Equations (1) to (3) are all expressed explicitly.

Export Sector. The model assumes that Philippine exports (EXP_i) face a constant elasticity demand function.

(5) $$EXP_i = E_0*(A_i/PE_i)^{\eta i}$$

where E_0 is constant, A_i is world price of i, and PE_i is the domestic price of exports. There is a divergence between the export price and the domestic price of the goods through the following equation

(6) $$PE_i = PWE_i*ER/(1+TE_i)$$

where PWE_i is the world price of export, and TE_i is export tax.

Domestic Production. Domestic production of good i is described by a Cobb-Douglas production function with 3 types of factor inputs: labor (LB_i), mixed factor, (MX_i), and capital, KAP_i.

(7) $$DOMSS_i = A_i*LB_i^{\alpha i}*MX_i^{\beta i}*KAP_i^{(1-\alpha i-\beta i)}$$

Demand for Factor Inputs. Assuming perfect competition, profit maximization requires that each of the factor price should equal to the value of the marginal product. Thus, for labor factor the following equation applies

(8) $$WA*LB_i = XD_i*PVA_i$$

where WA is the average wage rate and PVA_i is the net value added price which is defined as

(9) $$PVA_i = PX_i - E_j IO_{ij}*PX_j - (ITAX_i + DEPXD_i + IMPXD_i)$$

where IO_{ij} in the input-output technical coefficient matrix, $ITAX_i$ indirect tax rate, $DEPXD_i$ ratio between depreciation and output, and $IMPXD_i$ ratio between imports and total output.

For the mixed factor the following equation holds

(10) $$RENTMX*MX_i = XD_i*PVA_i$$

where RENTMX is the average mixed factor rent. Lastly, for capital the following relationship applies

(11) $$RENTKAP*LB_i = XD_i*PVA_i$$

where RENTKAP is the average capital rent

The supply of each of these factors is assumed fixed. Therefore, each of the factors is cleared through changes in each of the respective factor prices. If the demand for a given factor decreases, given fixed supply, the factor price would have to adjust to clear the market. Changes in factor prices are relevant to issues on income distribution. Furthermore, the market for agricultural labor is separated from the market for non-agricultural labor. This means that there are two separate average market clearing wages; one for the agricultural sector and another for non-agricultural.[3] Again, this is relevant to the income distribution analysis.

Further refinements of the model may have to be done. For example, the labor market may have to be modified to account for some wage rigidity mechanisms. Instead of a market clearing wage, a partial adjustment mechanism may be imposed so that wages may not clear the labor market instantaneously. Thus, quantity adjustments through unemployment changes need to be invoked to somehow clear the market within a period. This specification will therefore allow for unemployment analysis, which is relevant to the issue on income distribution. Furthermore, if a Phillips curve equation is attached to unemployment, the delayed response in wage adjustment can be linked to changes in macroeconomic policies such as monetary policy. This is one channel whereby the link between the real and the financial sectors of the model can be strengthened. In CGE literature, this is equivalent to imposing non-homogeneity condition in the system.

Income of Institutions. The incomes of the institutions, except government, have the same specification. The equation is simply the sum of all sources of incomes: (1) factor incomes, which is the product of the market clearing factor prices and the factor endowments of each of the institutions (which are fixed

[3]Note that in the future extension of the model, these two labor markets may be linked and augmented to account for labor migration from the agricultural sector to industry and service sectors. This is also relevant to the analysis on adjustment policies and income distribution.

within a given period); (2) secondary incomes, which is the product of a fixed coefficient matrix derived from the SAM and the incomes of the institutions, net of direct taxes (note that in the original SAM some of these incomes are dividends and equities incomes); (3) remittances of workers working abroad; (4) foreign transfers; and (5) other fixed incomes which are derived using fixed coefficient from the SAM.

Income of the government is derived from the following sources: (1) tariff revenue; (2) export tax revenue (if positive) or export subsidy (if negative); (3) indirect tax; (4) income from its capital endowment; (5) secondary income, derived similarly as in the other institutions; (6) foreign transfers; and (7) other fixed incomes which are derived using fixed coefficient similar to the other institutions.

Consumption of Institutions. The consumption (CC_{inst}) is uniformly specified for all institutions, except government. It is given by

$$(12) \qquad CC_{inst,i} = CLES_{inst}*APCDOM_{inst}*Y_{inst}(1-DTAX_{inst})/PX_i$$

where $CLES_{inst}$ consumption share (derived from the SAM); $APCDOM_{inst}$ average propensity o consume (derived from the SAM); Y_{inst} income of institutions; and $DTAX_{inst}$ direct tax rate.

Savings and Other Sources Funds. Savings of the institutions are derived as residuals between income and consumption. Institutional savings, together with institutional domestic borrowings from the "capital" market and from capital transfers from the rest of the world to the capital institutions, are the major sources of investable funds in the model, which in turn are placed in 4 types of assets: inventory of commodities, physical assets, money assets, and other financial assets. In the present specification of the model, the level of these assets are determined as fixed proportions using data from the SAM. Ideally, asset allocations by institutions have to be modeled behaviorally using portfolio choice, i.e., investable funds of the institutions will be invested in an asset placement with the highest rate of return. In the context of the model, investable funds of the institutions can move across physical assets, money assets, and other financial assets depending upon their respective rate of return. Rate of return of an asset may be related to interest rate, which in turn is affected by changes in the monetary policy. This has not been done yet at present.

Therefore, using fixed proportions physical assets of the institutions are derived. Together with depreciation (or capital consumption allowance, which is derived as fixed proportion of industry output), these physical assets of the institutions determine the level of industry investments or capital expenditure of industries using fixed proportions also.

Money assets and other financial assets, together with foreign borrowings, are placed in the "lending" sector, which provides funds for domestic borrowing activities. At present, the two major sectors in the capital market, domestic borrowing and lending, have not been modeled, but expressed instead as a set of accounting identities. The modeling of these two sectors would have to be done later.

Foreign capital borrowings is treated an endogenous variable in the model. For example, if a price distortion like changes in tariff rates is imposed on the model, and if this results in changes in the accounting balances, foreign capital borrowings will change automatically to clear both the domestic borrowing and lending activities, and the balance of payments. In the absence of a behaviorally specified financial sector, this creates a major weakness because it assumes that foreign capital is readily available to finance all these gaps. But as mentioned above, this is just a temporary specification, and it will be modified shortly.

Closure Condition. The model is flexible in terms of closure rule. At present the model is closed in the balance of payments equation with the exchange rate as the clearing variable. Foreign capital inflows is therefore exogenous. Net foreign capital inflows (i.e., net of current account financing) go into the investable fund equation.

2. Linking Matrix.

Orbeta (1994) developed a framework[4] for simulating the effects of food policies in which three types of policy instruments were identified: supply shifters, demand shifters, and price wedges. From an estimated demand curves for food (q_i), the percentage change in quantities demand can be expressed as:

$$(13) \qquad \dot{q}_i = \Sigma^n{}_j e_{ij} \dot{p}^d{}_j + \gamma_i \dot{y} \qquad i = 1, \ldots, n$$

where the dots (•) indicate percentage changes, e_{ij} direct and cross-price elasticities of demand; $p^d{}_j$ demand price; γ_i income elasticity of demand; and y income. On the other hand, supply changes can be represented as

$$(14) \qquad \dot{q}_i = \Sigma^n{}_j s_{ij} \dot{p}^s{}_j + \delta_i \qquad i = 1, \ldots, n$$

where s_{ij} are the supply elasticities, $p^s{}_j$ supply price and δ_i supply shift variable.

Moreover, to allow for price subsidies, the equilibrium relationship can be written as

$$(15) \qquad \dot{p}^s{}_i = \dot{p}^d{}_i + \dot{\beta}_i \quad i = 1, \ldots, n$$

where β_i is the size of subsidy wedge for commodity i.

[4]The framework was originally developed by Quisumbing (1985).

In matrix form these three sets of n equations can be expressed as

$$(16)\qquad \begin{bmatrix} -H & O & I & \dot{P}^d \\ O & -S & I & \dot{P}s \\ -I & I & O & \dot{Q} \end{bmatrix} = \begin{bmatrix} \dot{\Gamma y} \\ \Delta \\ \dot{B} \end{bmatrix}$$

where
H : n x n matrix of demand elasticities, e_{ij}
S : n x n matrix of supply elasticities, s_{ij}
P^d: n x 1 vector of demand prices, $p^d{}_i$
P^s: n x 1 vector of supply prices, $p^s{}_i$
Q : n x 1 vector of quantities, q_i
Γ : n x 1 vector of income elasticities of demand, γ_i
Δ : n x 1 vector of supply shifts, δ_i
B : n x 1 vector of price subsidies, β_i

The solution for the changes in equilibrium prices and quantities as a function of the policy variables can be expressed as

$$(17)\qquad \begin{bmatrix} \dot{P}^d \\ \dot{P}^s \\ \dot{Q} \end{bmatrix} = \begin{bmatrix} (S-H)^{-1}(\Gamma\dot{y} - \Delta - S\dot{B}) \\ (S-H)^{-1}(\Gamma\dot{y} - \Delta - H\dot{B}) \\ H(S-H)^{-1}(SH^{-1}\Gamma\dot{y}-\Delta-S\dot{B}) \end{bmatrix}$$

Thus, given the changes in the equilibrium consumption of commodities, the percentage change in the equilibrium level of nutrient consumption is

$$(18)\qquad \dot{N} = K\,\dot{Q} = K\{H(S-H)^{-1}(SH^{-1}\Gamma\dot{y} - \Delta - S\dot{B})\}$$

where K is an 1 x n vector of K_i, the fraction of initial total nutrient consumption provided by commodity i. This equation serves as the linking equation, while Q as the linking matrix.

This framework allows one to compute for the changes in calorie and protein consumption under policy changes affecting the market for food. The parameters of the matrix are derived from the household models estimated by Orbeta and Alba (1996).

Simulation Results

1. Tariff Rates.

The sectoral implicit tariff rates were computed using price comparison between domestic and border prices (Manasan and Querubin, 1997). In particular, for product/commodity j the formula is given by

$$(19) \qquad T_j = P_d / P_b - 1$$

where P_d is the domestic wholesale price obtained from the National Statistics Office and the Bureau of Agricultural Statistics, and P_b is the border price from the Hongkong Trade Statistics and FAO.

The implicit tariff rate was adjusted for duty exemption using the following adjustment

$$(20) \qquad T_j^{adj} = (T_j M_j - D_j) / M_j$$

where T_j^{adj} is the duty exempted implicit tariff rate of commodity/product j; T_j is the computed implicit tariff rate; M_j total imports of sector j for a given year; D_j is the value of revenue foregone from duty exemptions of imports of sector j.

Data used to compute for the price comparison estimates were available for the years 1990-1995 only. To smoothen out year-to-year fluctuations, the average price relatives in the three-year period ending in the current year was used in estimating implicit tariff rates. For example, the average price ratios for 1991, 1992 and 1993 were used to estimate the implicit tariff rate for 1993. Moreover, the relative price estimates obtained for 1995 were assumed to hold in 1995-2000 for the remaining regulated items in estimating the "price comparison" implicit tariff rates.

Originally, Manasan and Querubin estimated the implicit tariff rates with adjustments for 169 sectors. To make sectors consistent with the sectors of the model, further aggregation was made to 34 sectors. The aggregation used import-plus-output as weights. This system of weighting overcomes the biases associated with output weights or import weights alone. To facilitate the analysis, the rates were further aggregated into 5 major sectors: total agriculture; mining; total manufacturing, food manufacturing and other manufacturing.

The implicit tariff rates for the 5 major sectors are shown in Figure 1. One can observe that there is a general decline in the implicit tariff rates in all major sectors starting 1995. Food manufacturing still has the highest implicit tariff rate level, while mining has the lowest. In 1992, the implicit tariff rate of agriculture crossed the declining rate of other manufactures. It increased up to 1994 and started to decline in 1995. From 1996 to 2000, its implicit tariff rate is above other manufactures but below total manufactures

2. Results.

Economy-Wide Model. Table 2 shows the effects of changes in implicit tariff on income distribution. The results percent difference in the share of household income between the scenarios (implicit tariff rates from 1990 to 2000) and the base. The annual fluctuations in the computed implicit tariff rates resulted also in annual fluctuations the simulation results. However, period totals were computed to facilitate the analysis.

From 1990 to 1994, the results show a progressive change, i.e., households under group 1 (first decile) up to household group 7 (seventh decile) enjoyed a positive total increase in their share of the income pie. The last three household groups, 8 to 10, suffer a decline in the share.

However, during the period 1995 and 1996, the change in the implicit tariff rates indicates some degree of regressivity. Lower income groups suffer from a declining in share in the income pie. It is important to note that it was during this period when implicit tariff rates on agriculture registered the biggest drop.

From 1996 to 2000, the results indicate favorable effects for the lower income household groups. From first to the seventh groups register an increase in their income shares, while the eighth to the tenth suffer a decline. The share of the second group shows the largest increase among the household groups with increasing income share.

In general, the simulation results indicate progressive effects, except for the first decile. For the entire period, 1990 to 2000, the last three income groups suffer a decline in their income share, while the second to the seventh income groups enjoy an increase. Unfortunately, unfavorable effect is observed in the first decile. Its income share declined by -1.7 percent over the entire period.

Table 3 shows the absolute change in income of households from the base. The progressive effect of the tariff change is pronounced during the period 1990-1994, with the first five income groups enjoying above two percent increase over the base. The increase in income for the last two groups from the base is less than 1 percent. An opposite effect is seen in 1995 and 1996. The poor income groups (first to fourth) suffer a decline, while the eighth to tenth enjoy a positive increase. However, favorable effects are observed during the period 1996-2000.

Over the entire period, 1990-2000, all income groups enjoy an increase in their absolute income from the base. However, the lowest increase in seen in the first group.

Table 4 presents the percent change in consumption relative to the base. Almost the same pattern is observed as in the previous tables, except that higher income groups show higher increase than lower income over the entire period.

The results on factor prices are shown in Table 5. Presented are results on agricultural wages (WAAG); non-agricultural wages (WANAG); price of mixed factor (RENTMX);

and price of capital (RENTKAP). The increase in WAAG of 9.7 percent during the period 1990-1994 is higher than the rest of the factor prices. This triggers the progressive effects during the period since lower income groups heavily depend on agricultural labor.

In the succeeding two years, 1995 and 1996, the effect on WAAG is negative. In fact, WAAG declines by a -14.7 percent. Furthermore, the price RENTMX declines by -5.3 percent. The suppliers of these two factors, agriculture labor and mixed factors, are mostly households in the lower groups. Thus, the decline in income both in terms of absolute and of distribution share of these groups during the period can partly be due to the decline in the prices of these factors.

All factor prices increase in the succeeding period, 1996-2000. However, the RENTKAP shows the highest increase of 18.3 percent. The increase of 12.9 percent in RENTMX somehow offset the relatively high increase in RENTKAP. This reason why the lower income groups are not that worse off. However, over the entire period 1990-2000, the increase WANAG and RENTKAP is higher than the increase in WAAG and RENTMX.

Table 6 shows the resource allocation effects indicated by the percent difference of the sectoral share of output and factor inputs between the results of the annual runs and the base run. The results indicate a resource movement from agriculture and construction to manufacturing and utilities. This is reflected in the negative numbers for agriculture and construction and positive for the rest of the sectors, particularly manufacturing, for almost all periods considered. In particular, for the entire period 1990-2000, the share of agriculture to the total output declines by -31 percent, while construction drops by -22.7 percent. The share of total manufacturing increases by 10.6 percent over the same period. Specifically, the share of other manufacture increases by 15.2 percent, while the share of utilities increases by 38.8 percent.

Factor inputs move generally in the same manner, i.e., labor, mixed factor, and capital move from agriculture and construction to manufacturing and utilities. Among the three factor inputs, mixed factor of agriculture registers the biggest drop.

Table 7 presents the absolute change in sectoral output and factor inputs from the base value. Similar pattern holds as in the previous table, i.e., a resource movement from agriculture and construction to manufacturing and utilities. The resource movement, particularly from agriculture, is the critical factor behind the declining income share of the first household. This group heavily depends on both agriculture labor and mixed income. The effect is seen to be more pronounced in 1995 and 1996 when both income share and absolute income of the first five income groups drop.

Calorie and Protein Availability. The results of economy-wide model simulations concerning tariff changes were translated into changes in food availability through the use of the linking matrix. In particular, results on output prices and income of households were translated into protein and calorie availability. To do this, preliminary steps were done:

(a) The nutrition model estimated by Orbeta and Alba (1997) (upon which the parameters of the linking matrix were based), has the following food and non-food items in the specification: cereals; fruits; meat; dairy and eggs; beverage; other food, and non-food items. To link these with the sectors in the economy-wide model the following sector conversion was made (note: the sectors in the economy-wide were aggregated to sectors in the household model using value of sectoral output in the base run)

Sectors in Nutrition Model	**Sectors in Economy-Wide Model**
Cereals	Palay and Corn
	Rice and Corn Milling
Fruits	Fruits
Meat	Meat Manufacturing
Dairy and Eggs	Livestock and Poultry
Fish	Fishery
	Fish Manufacturing
Beverage	Beverage and Tobacco
Other Foods	Coconut and Sugar
	Sugar Milling
	Other Food
Non-Food	Rest of the Sectors in the Model

(b) Household groups in the nutrition model were classified in quintile. However, in the economy-wide model households were grouped in decile. To link the model groups the following conversion was made

Households in Nutrition Model	**Households in Economy-wide Model**
First Quintile	First and Second Decile
Second Quintile	Third and Fourth Decile
Third Quintile	Fifth and Sixth Decile
Fourth Quintile	Seventh and Eighth Decile
Fifth Quintile	Ninth and Tenth Decile

The nutrition effects of the tariff change are shown in Table 8. The results are absolute changes from the base (not percent differences). One can observe that for the period 1990-1994, the results are all positive for all five households in terms of protein and calorie availability. However, a closer look at the magnitude of the change per household reveals that the impact is a bit regressive, i.e., the fifth quintile benefits the most in terms of both protein and calorie availability. This does not quite follow to was what found earlier on income results which indicated some degree of progressive effects. What is at work in the present result is that the income effect could offset to the price effects, so that the net effect is negative. Indeed, in Table 9 prices of food manufactures increase by 14.5 percent from the base, higher than other sectors except services. It also interesting to note that although all implicit tariff rates register a general decline during the period, the implicit tariff rate on food manufacturing is still the highest among all major groups.

The effect on the lower income groups during the period 1995-1996 is worse: not only it is regressive in terms of income, it is also regressive in terms of protein and calorie availability. Lower income groups witness an absolute decline in income as well as in food availability.

In the period 1996-2000, all household groups register negative change in calorie availability. However, the decline in the first household is lower in the second to the fifth household. However, over the same period, the effect on protein availability is clearly regressive, as the lower income groups suffer a decline, while the higher income groups enjoy an increase.

Over the entire period, the impact on both protein and calorie availability is highly regressive. Lower income groups suffer a decline both in terms of protein and calorie availability. However, over the same period, the effect on income distribution was progressive, as observed above, except for the poorest of the poor, the first household group. This implies that the generally favorable income effects could not offset the unfavorable price effects on food.

Remarks

The reforms in the trade sector intensified beginning 1992. From that year on to the mid-1997, the economy registered a robust economic growth in terms of gross domestic product (see table below). Interestingly, during the same period, poverty incidence consistently dropped from 44.2 percent in 1985 to 35.5 percent in 1994 to 32.1 percent in 1997. There was a significant drop in the poverty incidence in the National Capital Region (NCR) from 23.1 percent in 1985 to 8.0 percent in 1994 and further down to 7.1 percent in 1997. Although poverty incidence in areas outside NCR also dropped over the same period, the drop was considerably less than the NCR's. In 1997, poverty incidence in these areas was still very high at 36.2 percent. Furthermore, in a more poorer regions like the CAR, poverty incidence in 1997 was still above 40 percent. Clearly, there was a deterioration in the gap between the urban and the rural areas.

Philippine Economy

	1985	1991	1994	1997
Real GDP growth (%)	-7.2	-0.6	4.4	5.2
Gini Ratio	0.446	0.468	0.451	0.496
Poverty Incidence				
Philippines	44.2		35.5	32.1
NCR	23.0		8.0	7.1
Outside NCR	47.5		39.9	36.2
CAR			51.0	42.3

Where NCR is National Capital region, CAR is Cordillera Autonomous Region.

The indicators on income distribution do not show favorable signs either. Over the past decade, there was a marked deterioration in the distribution of the country's wealth. During the 12 year period beginning 1985, the wealthiest quintile of families exhibited an increase in its income share, while the other quintiles suffered income reduction. The income share of the poorest or the first quintile fell from 5.2 percent in 1985 to 4.9 percent in 1994 before reaching 4.4 percent in 1997. Conversely, the share of the wealthiest income group improved from 52.1 percent in 1985 to 55.8 percent in 1997.

The deterioration in income distribution during the past decade represented some movement in the income distribution picture which had been relatively stable since 1961. From the time until the mid-1980s, there were very small movements in the income shares of the different income groups. During this period of relatively "stable inequality", the share of the richest income group remained substantially large while that of the poorest income group remained substantially small.

Since 1961, except for the years 1988-1991, the Gini ratio, which is a measure of income inequality, has been on a slow but steady decline. From 1994 to 1997, however, the Gini ratio worsened significantly from 0.451 to 0.496, the latter representing the highest registered figure in the three and a half-decades. In 1985, the average income of a family belonging to the wealthiest decile was 18 times the income of a family belonging to the poorest decile. In 1997, this went up to 24. In terms of spatial income disparity, the same trend was observed as the ratio of the average family income in the poorest region likewise increased from 3.2 in 1995 to 3.6 in 1997.

The simulation results generated from the present exercise somehow tie up with the above facts. Generally, the results indicate that changes in the tariff structure resulted in significant resource movement out of agriculture to manufacturing. As a result, the first decile suffers from both a decline in income share and in absolute income. This is because this household group heavily depends on agriculture. In terms of food availability, the results are highly regressive.

However, some degree of progressivity is seen from the second to the tenth decile. The income share of the second to the seventh income groups increases, while the share of the eighth to the tenth declines during the simulation period.

The simulation results of Yap (1997) indicate a general trend that the growth in output tends to favor the upper income groups, i.e., income distribution generally deteriorates when output increases. Thus, the lesson that can be learned out of these exercises is that while it is true that higher income growth is needed to alleviate poverty, there is still much to be done in order for the lower income classes to be direct participants in the growth process. Furthermore, while structural adjustments such as trade reforms are necessary for a sustained growth in the long term, special programs such as "safety nets" have to be designed and implemented effectively so as to minimize the negative effects, especially during the transition and adjustment period. Households in the lower income brackets may not have the flexibility to adjust automatically during periods of major shifts in the economic structure.

Table 1
LIST OF EXECUTIVE ORDERS AND LEGISLATION AMENDING THE TARIFF CODE

Executive Order No. 470 (dated July 1991)

- increases number of commodity line with high tariffs
- reduces number of commodity line with low tariffs

Executive Order No. 478 (dated August 23, 1991)

- imposes special duties of P0.95 per liter of P151.05 per barrel on imported crude oil falling under Hdg. No. 27.09 and P1.00 per liter on imported oil products.

Executive Order No. 1 (dated June 30, 1992)

- reduces rates of import duty on electric generating sets to 0% until June 30, 1995.
- intended to provide partial remedy to the energy crisis.

Executive Order No. 2 (dated July 1, 1992)

- extends the affectivity of the zero rate of duty on cement and cement clinker up to June 30, 1995 (under e.o. No. 470, these articles will be subjected to rates of duty of 20% and 10%, respectively, beginning July 1, 1992)
- intended to stop possible shortage of localy supply if zero duty will be lifted

Executive Order No. 5 (dated July 14, 1992)

- shortens the operation of the zero rate of import duty on cement and cement clinker from June 30, 1995 (as provided in E.O. No. 2) to June 30, 1993.

Executive Order No. 8 (dated July 24, 1992)

- provided for interim increased tariff protection in lieu of import restrictions
- items covered include livestock, meat, fish, crustaceans, mollusks, sausages and other prepared meat, cane or beet sugar, maize, cereal grains, air or vacuum pumps, fans, aircon, refrigerators/freezers, centrifuges, washing machines, sewing machines, electric accumulators, thermionic/cold cathode, public transport type passenger motor vehicle and parts.
- import restrictions lifted on November 1, 1992.

Memorandum Order No. 60 (dated November 5, 1992)

- held in abeyance until February 28, 1993 the implementation of E.O. No. 8 with respect to maize

Executive Order No. 43 (dated December 29, 1992)

- modified the rate of import duty on certain imported articles to implement the 1991 and 1992 Phil program submitted to the Third ASEAN summit providing a minimum level of 25% margin of preference.

Executive Order No. 61 (dated February 27, 1993)

- modified the nomenclature and tariff rates on certain agricultural products; animals fresh chilled or frozen, corn and feedwheat
- in line with R.A. No. 7607 (The Magna Carta of Small Farmers)

Table 1
LIST OF EXECUTIVE ORDERS AND LEGISLATION AMENDING THE TARIFF CODE

Executive Order No. 94 (dated June 1, 1993)

- reduced the import duty on cement to 5% and cemnt clinker to 3% until June 30, 1994 (per E.O. No. 5, the zero duty on these items will only be effective until June 30, 1993 and therefore the rates of 20% on cement and 10% on cement clincker under E.O. No. 470 will be applied thereafter)
- implemented due to uncertainty in the power supply and therefore possible shortage in the local supply of cement

Executive Order No. 106 (dated July 16, 1993)

- lifted the suspension of the application of the tariff concessions granted by the Philippines in refractory bricks under the AFTA

Executive Order No. 115 (dated July 24, 1993)

- increased the special duty of P1.90 per kiter or P302.10 per barrel on imported crude oil and oil products under Hdg. No. 27.09 and P2.00 per liter on imported oil products falling under Hdg. No. 27.10 and 27.11

Executive Order No. 116 (dated July 29, 1993)

- amended E.O. No. 94 to conform with nomenclature

Executive Order No. 119 (dated July 29, 1993)

- lifted the suspension of the application of the tariff concessions granted by the Philippines on refractory bricks under the AFTA, amending E.O. 106 to reflect technical modifications

Executive Order No. 145 (dated August 9, 1993)

- modified rates of duty on certain imported articles under the CEPT-AFTA

Executive Order No. 146 (dated December 27, 1993)

- amended E.O. 43 and modified the margin of preference and the applicable ASEAN preferential tariffs

Executive Order No. 147 9dated December 27, 1993)

- modified the rate of import duty on certain imported articles to implement the agreement on the global system of trade preference among developing countries

Executive Order No. 148 (dated December 27, 1993)

- modified the rate of duty on certain imported articles

Executive Order No. 153 (dated January 25, 1994)

- modified the rate of duty on certain imported articles to implement the minimum 90% margin of prefence included in the NESTLE ASEAN Industiral Joint Ventures

Table 1
LIST OF EXECUTIVE ORDERS AND LEGISLATION AMENDING THE TARIFF CODE

Executive Order No. 160 (dated February 23, 1994)

- reduced the special duties on crude oil products from p1.90 to P0.95 under Hdg. No. 27.09 and from p2.00 to P1.00 on imported oil products falling under Hdg. No. 27.10 and 27.11

Executive Order No. 172 (dated April 24, 1994)

- increased the minimum tariff rate from 0% to 3%

Executive Order No. 189 (dated July 18, 1994)

- modifies the nomenclature and rates of duty on capital equipment from 10%-20% to 3%-10% (Note: major changes)

Executive Order No. 204 (dated September 30, 1994)

- modifies the nomenclature and rates of duty on textile and chemical input thereto (Note: major changes)

Executive Order No. 227 (dated March 4, 1995)

- reduced the import duty on Portland cement (3%), cement clinker 93%), and Pozzolan Cement (10%); this suspends the implementation of the 20% and 10% under E.O. 470

Executive Order No. 264 (dated July 22, 1995)

- modified the nomenclature and rates of duty on manufacturing industries in line with the Tariff Reform Program; involves 4142 HS lines (Note: major changes)

Executive Order No. 287 (dated January 1, 1996)

- modified the rate of duty on cetain imported articles to implement the 1996 Philippine schedule of tariff reductions under the new frame of the accelerated CEPT scheme for the AFTA

Executive Order No. 288 (dated December 12, 1995)

- modified the nomenclature and rates of import duty on certain imported articles, i.e., non-sensitive agricultural products; (Note: major changes)

Executive Order No. 313 (dated March 29, 1996)

- modified the nomenclature and rates of import duty on certain imported articles, i.e., sensitive agricultural products;
- implements tariffication after import restrictions were lifted under R.A. 8178
- IRR only issued on July 1 and effective July 10, 1996
- Note: major changes

Executive Order No. 328 (dated (April 23, 1996)

- modified the nomenclature and rates import duty on imported wheat for food

Executive Order No. 365 (dated (April 16, 1996)

- modified the rates of duty on crude oil (from 10% to 3%) and refined petroleum product from 20% to 7%).

Summary results of Economy-Wide Model runs involving implicit tariff changes from 1988 to 2000 (base run: 1988)

Table 4. Changes in consumption (scenario vs base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
HH1	-0.16%	0.57%	-0.69%	0.94%	1.44%	-2.98%	-0.12%	1.54%	0.22%	2.10%	5.92%
HH2	-0.14%	0.68%	-0.38%	0.97%	1.56%	-2.45%	0.96%	1.76%	0.12%	2.33%	6.50%
HH3	-0.09%	0.66%	-0.19%	0.92%	1.55%	-1.85%	1.63%	1.71%	0.18%	2.33%	6.53%
HH4	-0.08%	0.65%	-0.06%	0.84%	1.39%	-1.51%	1.83%	1.69%	0.25%	2.30%	6.46%
HH5	-0.03%	0.58%	0.07%	0.70%	1.21%	-0.76%	2.31%	1.44%	0.43%	2.17%	6.18%
HH6	0.04%	0.49%	0.25%	0.64%	1.06%	-0.21%	2.66%	1.28%	0.63%	2.02%	5.95%
HH7	0.11%	0.32%	0.44%	0.50%	0.80%	0.74%	3.18%	0.82%	0.86%	1.77%	5.44%
HH8	0.21%	0.22%	0.55%	0.46%	0.69%	1.35%	3.41%	0.57%	1.23%	1.56%	5.07%
HH9	0.23%	0.09%	0.60%	0.46%	0.70%	1.70%	3.89%	0.74%	1.07%	1.71%	5.15%
HH10	0.33%	0.03%	0.27%	0.58%	1.19%	1.27%	4.27%	1.58%	0.89%	2.33%	5.96%

Period Totals

	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
HH1	-0.88%	2.10%	-3.10%	9.65%	8.77%
HH2	0.24%	2.69%	-1.49%	11.67%	11.91%
HH3	1.01%	2.86%	-0.22%	12.38%	13.40%
HH4	1.23%	2.75%	0.32%	12.52%	13.76%
HH5	1.78%	2.54%	1.55%	12.53%	14.31%
HH6	2.26%	2.47%	2.45%	12.54%	14.80%
HH7	2.90%	2.17%	3.92%	12.06%	14.97%
HH8	3.47%	2.13%	4.76%	11.84%	15.31%
HH9	3.78%	2.08%	5.59%	12.56%	16.34%
HH10	3.68%	2.41%	5.55%	15.03%	18.71%

Summary results of Economy-Wide Model runs involving implicit tariff changes from 1988 to 2000 (base run: 1988)

Table 5. Changes in prices of factors (scenario vs base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
WAAG	-0.70%	1.30%	-0.60%	4.60%	5.10%	-11.00%	-3.70%	-0.30%	0.10%	1.40%	9.50%
WANAG	0.30%	-0.70%	1.70%	0.20%	-0.50%	5.50%	5.60%	-2.60%	3.00%	0.40%	3.50%
RENTMX	-0.40%	0.70%	-1.10%	0.50%	1.20%	-5.00%	-0.30%	4.40%	-1.90%	3.30%	7.40%
RENTKAP	0.60%	0.80%	0.40%	1.00%	2.40%	5.70%	5.70%	-0.30%	4.10%	2.90%	5.90%

Period Totals

	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
WAAG	-1.30%	9.70%	-14.70%	7.00%	5.70%
WANAG	6.50%	1.00%	11.10%	9.90%	16.40%
RENTMX	-4.10%	0.90%	-5.30%	12.90%	8.80%
RENTKAP	10.90%	5.20%	11.40%	18.30%	29.20%

Summary results of Economy-Wide Model runs involving implicit tariff changes from 1988 to 2000 (base run: 1988)

Table 2. Income distribution effects (percent difference in household income share between scenario and base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
HH1	-0.22%	0.37%	-0.61%	0.46%	0.73%	-2.86%	-1.74%	1.18%	-0.80%	0.60%	1.14%
HH2	-0.17%	0.40%	-0.42%	0.55%	0.88%	-2.53%	-1.03%	1.40%	-0.75%	0.81%	1.60%
HH3	-0.15%	0.34%	-0.34%	0.48%	0.77%	-2.12%	-0.82%	1.20%	-0.62%	0.71%	1.42%
HH4	-0.12%	0.30%	-0.28%	0.43%	0.67%	-1.85%	-0.70%	1.12%	-0.48%	0.66%	1.31%
HH5	-0.07%	0.21%	-0.17%	0.29%	0.46%	-1.17%	-0.38%	0.85%	-0.28%	0.51%	0.98%
HH6	-0.03%	0.12%	-0.07%	0.18%	0.25%	-0.73%	-0.27%	0.49%	-0.07%	0.27%	0.60%
HH7	0.02%	-0.03%	0.09%	0.01%	-0.04%	0.16%	0.09%	-0.11%	0.16%	-0.06%	-0.01%
HH8	0.09%	-0.11%	0.16%	-0.10%	-0.24%	0.68%	0.12%	-0.58%	0.49%	-0.39%	-0.55%
HH9	0.06%	-0.17%	0.18%	-0.19%	-0.34%	0.97%	0.39%	-0.70%	0.29%	-0.40%	-0.70%
HH10	0.02%	-0.08%	0.04%	-0.17%	-0.21%	0.58%	0.28%	-0.23%	-0.01%	-0.11%	-0.38%

Period Totals

1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
-2.1%	0.7%	-4.6%	0.4%	-1.7%
-1.3%	1.2%	-3.6%	2.0%	0.7%
-1.0%	1.1%	-2.9%	1.9%	0.9%
-0.8%	1.0%	-2.5%	1.9%	1.1%
-0.4%	0.7%	-1.5%	1.7%	1.2%
-0.3%	0.5%	-1.0%	1.0%	0.7%
0.2%	0.1%	0.3%	0.1%	0.3%
0.5%	-0.2%	0.8%	-0.9%	-0.4%
0.5%	-0.5%	1.4%	-1.1%	-0.6%
0.2%	-0.4%	0.9%	-0.4%	-0.3%

Summary results of Economy-Wide Model runs involving implicit tariff changes from 1988 to 2000 (base run: 1988)

Table 3. Changes in household income level (scenario vs base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
HH1	-0.16%	0.57%	-0.69%	0.94%	1.44%	-2.98%	-0.12%	1.54%	0.22%	2.10%	5.92%
HH2	-0.12%	0.59%	-0.51%	1.03%	1.60%	-2.64%	0.60%	1.76%	0.27%	2.31%	6.40%
HH3	-0.09%	0.53%	-0.43%	0.97%	1.49%	-2.24%	0.81%	1.56%	0.40%	2.21%	6.21%
HH4	-0.06%	0.50%	-0.36%	0.91%	1.39%	-1.96%	0.93%	1.48%	0.54%	2.15%	6.10%
HH5	-0.01%	0.41%	-0.25%	0.77%	1.18%	-1.29%	1.26%	1.21%	0.74%	2.01%	5.76%
HH6	0.03%	0.31%	-0.15%	0.66%	0.97%	-0.85%	1.37%	0.85%	0.95%	1.75%	5.35%
HH7	0.08%	0.16%	0.00%	0.49%	0.67%	0.03%	1.74%	0.24%	1.19%	1.42%	4.71%
HH8	0.15%	0.09%	0.07%	0.38%	0.47%	0.55%	1.76%	-0.23%	1.52%	1.09%	4.15%
HH9	0.12%	0.02%	0.10%	0.29%	0.37%	0.85%	2.04%	-0.35%	1.32%	1.08%	4.00%
HH10	0.07%	0.11%	-0.04%	0.31%	0.50%	0.46%	1.93%	0.13%	1.02%	1.37%	4.33%

Period Totals

1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
-0.9%	2.1%	-3.1%	9.6%	8.8%
0.0%	2.6%	-2.0%	11.3%	11.3%
0.2%	2.5%	-1.4%	11.2%	11.4%
0.4%	2.4%	-1.0%	11.2%	11.6%
0.8%	2.1%	0.0%	11.0%	11.8%
1.0%	1.8%	0.5%	10.3%	11.2%
1.4%	1.4%	1.8%	9.3%	10.8%
1.7%	1.2%	2.3%	8.3%	10.0%
1.7%	0.9%	2.9%	8.1%	9.8%
1.4%	0.9%	2.4%	8.8%	10.2%

Table 12: Weighted Implicit Tariff

	Sectors	1988	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	Palay and Corn	0.540	0.564	0.564	0.597	0.631	0.698	0.661	0.475	0.451	0.451	0.432	0.432
2	Fruits and Vegetables	0.180	0.214	0.216	0.212	0.208	0.205	0.201	0.131	0.106	0.088	0.088	0.064
3	Coconut & Sugar	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	Livestock & Poultry	0.030	0.048	0.040	0.036	0.045	0.029	0.026	0.033	0.030	0.027	0.023	0.023
5	Fishing	0.180	0.167	0.172	0.270	0.228	0.192	0.139	0.101	0.100	0.061	0.060	0.060
6	Other Agriculture	0.090	0.113	0.116	0.125	0.119	0.111	0.092	0.226	0.184	0.181	0.144	0.144
7	Forestry	0.180	0.179	0.120	0.119	0.120	0.118	0.108	0.048	0.034	0.034	0.034	0.034
8	Mining	0.050	0.138	0.089	0.086	0.070	0.079	0.075	0.042	0.042	0.033	0.033	0.033
9	Rice & Corn Milling	0.390	0.390	0.426	0.497	0.497	0.497	0.497	0.508	0.474	0.467	0.441	0.441
10	Milled Sugar	0.500	0.443	0.544	0.472	0.448	0.421	0.392	0.337	0.302	0.254	0.228	0.226
11	Meat Manufacturing	0.410	0.107	0.104	0.153	0.130	0.119	0.086	0.096	0.089	0.075	0.062	0.061
12	Fish Manufacturing	0.170	0.172	0.177	0.258	0.236	0.185	0.112	0.105	0.099	0.067	0.067	0.063
13	Beverage & Tobacco	0.490	0.378	0.395	0.392	0.388	0.384	0.380	0.237	0.195	0.158	0.150	0.145
14	Other Food Manufacturing	0.250	0.243	0.233	0.225	0.207	0.195	0.178	0.179	0.155	0.125	0.119	0.104
15	Textile manufacturing	0.280	0.249	0.247	0.230	0.218	0.212	0.120	0.121	0.091	0.079	0.078	0.057
16	Garments & Leather	0.250	0.270	0.269	0.268	0.267	0.266	0.160	0.160	0.153	0.106	0.106	0.100
17	Wood Manufacturing	0.200	0.181	0.204	0.190	0.173	0.158	0.140	0.140	0.140	0.091	0.091	0.091
18	Paper & Paper Products	0.240	0.272	0.268	0.236	0.207	0.199	0.166	0.170	0.170	0.112	0.112	0.112
19	Chemical Manufcturing	0.250	0.304	0.273	0.258	0.252	0.252	0.181	0.157	0.141	0.101	0.100	0.097
20	Petroleum Refining	0.260	0.110	0.096	0.121	0.120	0.129	0.112	0.025	0.023	0.022	0.022	0.022
21	Non-metal manufacturing	0.370	0.283	0.275	0.264	0.248	0.245	0.186	0.170	0.150	0.134	0.134	0.083
22	Metal Manufacturing	0.210	0.272	0.262	0.253	0.244	0.233	0.218	0.209	0.205	0.147	0.133	0.129
23	Electrical Equipment Manufacturing	0.290	0.229	0.223	0.195	0.177	0.139	0.098	0.087	0.087	0.230	0.230	0.230
24	Transport & Other Machinery Manufacturing	0.240	0.248	0.243	0.279	0.269	0.223	0.146	0.142	0.132	0.120	0.120	0.090
25	Other Manufacturing	0.230	0.179	0.149	0.143	0.132	0.121	0.086	0.087	0.077	0.056	0.054	0.047
26	Construction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	Electricity, Gas and Water	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	Financial Sector	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29	Private Education	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	Private Health	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31	Public Education	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	Public Health	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
33	General Government	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
34	Other Services	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 11: Sectoral Output Effects (percent difference between scenario and base)

	Sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	200
1	Palay and Corn	-1.2%	-1.4%	-5.8%	-1.7%	-5.1%	-10.3%	-0.8%	6.2%	-13.6%	-7.2%	2
2	Fruits and Vegetables	-1.3%	-1.1%	2.4%	9.4%	27.6%	-23.7%	-1.4%	-18.9%	-2.0%	-16.7%	-0
3	Coconut & Sugar	-0.3%	0.1%	-1.2%	5.8%	6.0%	13.4%	7.0%	-8.3%	12.8%	-1.2%	14
4	Livestock & Poultry	0.1%	0.9%	-2.8%	-12.8%	-26.7%	-0.1%	-7.0%	13.0%	7.8%	4.4%	-0
5	Fishing	-2.8%	1.4%	7.5%	-1.0%	-0.8%	-18.0%	-19.5%	10.5%	-16.1%	30.7%	-12
6	Other Agriculture	0.8%	2.1%	-1.9%	8.7%	0.0%	-3.2%	-1.0%	-8.2%	0.8%	-3.7%	5
7	Forestry	1.1%	-3.2%	0.8%	-2.0%	8.0%	-1.1%	-1.9%	19.4%	2.1%	-5.2%	3
8	Mining	0.3%	0.2%	1.4%	1.4%	2.2%	3.8%	0.9%	1.9%	2.4%	2.2%	-1
9	Rice & Corn Milling	-1.3%	-1.7%	-6.4%	-2.1%	-5.2%	-12.1%	-0.9%	6.7%	-16.3%	-8.2%	0
10	Milled Sugar	0.0%	0.2%	-0.2%	0.6%	3.6%	33.8%	-4.3%	-7.3%	14.7%	-0.1%	1
11	Meat Manufacturing	5.3%	0.0%	-7.9%	-23.3%	-29.7%	-4.0%	-1.6%	4.9%	18.8%	-0.3%	-17
12	Fish Manufacturing	-0.1%	-4.9%	3.0%	-1.8%	55.2%	76.9%	-19.7%	0.7%	0.2%	-7.3%	-14
13	Beverage & Tobacco	-2.0%	15.3%	9.7%	-11.2%	-2.0%	25.3%	27.4%	-17.3%	-5.8%	-12.5%	-14
14	Other Food Manufacturing	0.0%	0.0%	1.7%	17.2%	13.8%	9.7%	9.5%	-14.1%	13.6%	1.4%	28
15	Textile manufacturing	0.3%	0.1%	-0.2%	0.1%	0.6%	0.1%	6.3%	0.0%	-1.3%	4.6%	7
16	Garments & Leather	-0.4%	-0.4%	-1.0%	-1.9%	-1.8%	-2.0%	6.8%	-2.0%	-2.2%	5.2%	8
17	Wood Manufacturing	13.6%	-11.2%	-3.3%	-9.7%	11.2%	18.7%	18.3%	5.5%	6.1%	-7.4%	11
18	Paper & Paper Products	0.4%	0.8%	-0.3%	0.2%	11.3%	13.5%	0.2%	-3.1%	0.5%	7.1%	0
19	Chemical Manufcturing	-1.2%	0.4%	0.0%	1.1%	0.3%	1.6%	4.4%	4.9%	2.2%	7.0%	1
20	Petroleum Refining	0.8%	0.3%	2.7%	1.7%	2.0%	4.5%	0.3%	3.4%	3.3%	3.5%	1
21	Non-metal manufacturing	1.9%	2.7%	-0.5%	3.1%	1.0%	-3.7%	1.9%	-4.7%	-0.6%	6.7%	-11
22	Metal Manufacturing	0.1%	-0.1%	0.1%	1.4%	3.8%	4.4%	1.6%	1.0%	3.1%	0.7%	-4
23	Electrical Equipment Manufacturing	-0.2%	0.4%	-4.0%	9.8%	18.6%	-3.0%	9.3%	-7.2%	11.4%	-6.7%	6
24	Transport & Other Machinery Manufacturing	-0.4%	-0.1%	1.4%	0.8%	2.0%	6.5%	-1.2%	3.5%	32.8%	3.6%	3
25	Other Manufacturing	2.0%	3.2%	1.2%	-0.4%	4.9%	3.6%	0.7%	10.3%	-3.9%	-4.2%	0
26	Construction	0.0%	0.0%	-0.1%	-0.1%	-0.2%	6.2%	-1.1%	2.1%	-4.0%	0.1%	-22
27	Electricity, Gas and Water	0.9%	0.1%	9.0%	6.1%	-6.3%	13.0%	-2.8%	9.9%	12.4%	10.9%	7
28	Financial Sector	0.7%	-0.8%	-0.2%	-3.5%	-1.9%	-1.1%	-1.5%	-2.9%	1.5%	1.1%	-1
29	Private Education	1.3%	-21.9%	66.6%	2.8%	-32.5%	18.0%	39.0%	49.9%	-21.9%	-21.7%	47
30	Private Health	-10.5%	20.3%	5.3%	-2.2%	-26.0%	-6.7%	-19.5%	46.6%	-19.0%	31.2%	-14
31	Public Education	0.3%	0.0%	0.0%	-0.2%	-1.3%	-8.0%	0.9%	-5.6%	-12.4%	-0.2%	-0
32	Public Health	1.0%	-3.3%	0.7%	0.6%	2.5%	8.2%	-4.2%	-24.2%	17.1%	2.1%	-0
33	General Government	-1.3%	-1.3%	-2.8%	-2.3%	-3.7%	-1.9%	-5.6%	-10.6%	4.8%	-6.6%	-0
34	Other Services	0.2%	0.0%	-1.7%	0.3%	1.0%	1.4%	2.4%	0.6%	1.3%	1.3%	2

sectoral output effects	base 1988 level	simulated 1990 level
Palay and Corn	68,962.500	68,146.500
Fruits and Vegetables	61,389.800	60,587.900
Coconut & Sugar	20,684.500	20,613.100
Livestock & Poultry	72,220.900	72,267.300
Fishing	51,939.600	50,498.100
Other Agriculture	33,638.600	33,892.600
Forestry	13,865.100	14,012.200
Mining	60,146.200	60,310.400
Rice & Corn Milling	93,049.400	91,801.200
Milled Sugar	23,346.500	23,345.200
Meat Manufacturing	89,790.800	94,549.400
Fish Manufacturing	16,183.900	16,159.700
Beverage & Tobacco	32,682.800	32,031.900
Other Food Manufacturing	120,462.900	120,406.800
Textile manufacturing	52,854.800	53,010.200
Garments & Leather	68,411.400	68,129.300
Wood Manufacturing	26,792.200	30,423.100
Paper & Paper Products	25,046.700	25,158.700
Chemical Manufcturing	86,477.500	85,461.200
Petroleum Refining	74,519.400	75,110.700
Non-metal manufacturing	47,108.000	47,990.000
Metal Manufacturing	83,223.600	83,334.200
Electrical Equipment Manufacturing	85,142.900	84,955.100
Transport & Other Machinery Manufacturing	75,590.100	75,299.700
Other Manufacturing	58,775.000	59,954.900
Construction	141,690.500	141,757.500
Electricity, Gas and Water	44,468.300	44,865.100
Financial Sector	62,907.800	63,331.100
Private Education	16,792.300	17,008.400
Private Health	19,493.600	17,445.200
Public Education	28,148.000	28,229.900
Public Health	7,637.200	7,715.600
General Government	73,747.800	72,795.600
Other Services	639,334.300	640,474.100

Table 10: Sectoral Output Price Effects (percent difference scenario and base)

	Sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	Palay and Corn	-6.4%	-7.2%	-8.6%	-4.1%	-10.4%	-34.2%	32.2%	-28.5%	-30.0%	8.5%	-4.7%
2	Fruits and Vegetables	1.9%	1.7%	-3.1%	-9.1%	-25.3%	46.0%	4.1%	30.0%	6.0%	29.4%	8.0%
3	Coconut & Sugar	16.7%	3.4%	50.0%	40.0%	50.0%	40.1%	-35.0%	30.0%	-30.0%	26.9%	-13.8%
4	Livestock & Poultry	12.8%	-2.6%	-7.4%	-6.1%	33.3%	-7.6%	24.7%	-24.7%	19.9%	-12.7%	-23.4%
5	Fishing	4.0%	-2.1%	-9.3%	1.9%	8.8%	50.0%	35.0%	-12.2%	30.0%	-28.9%	23.7%
6	Other Agriculture	-3.6%	-6.7%	12.0%	-21.6%	6.8%	50.0%	35.0%	30.0%	30.0%	28.6%	28.1%
7	Forestry	7.7%	1.7%	-3.9%	0.9%	-12.2%	40.1%	23.8%	-35.0%	-1.2%	16.2%	-12.4%
8	Mining	10.2%	4.0%	0.3%	0.8%	-1.2%	-0.3%	-8.4%	10.8%	8.2%	2.6%	13.7%
9	Rice & Corn Milling	1.7%	2.6%	8.8%	6.0%	10.1%	19.6%	4.2%	-8.7%	30.0%	13.7%	8.6%
10	Milled Sugar	1.2%	7.9%	4.9%	-2.7%	-4.0%	-45.5%	31.9%	28.9%	-30.0%	-4.7%	0.0%
11	Meat Manufacturing	-5.5%	0.4%	9.3%	35.7%	49.9%	4.6%	3.4%	-4.5%	-16.2%	2.3%	29.7%
12	Fish Manufacturing	0.2%	6.8%	-3.7%	3.4%	-40.0%	-48.9%	35.0%	-0.7%	1.2%	11.7%	29.4%
13	Beverage & Tobacco	2.8%	-16.0%	-11.2%	17.2%	3.8%	-24.3%	-24.5%	30.0%	9.1%	20.8%	29.5%
14	Other Food Manufacturing	0.0%	0.6%	-2.8%	-20.3%	-17.9%	-12.1%	-11.2%	30.0%	-14.9%	1.2%	-25.9%
15	Textile manufacturing	-2.7%	-2.6%	-4.0%	-5.9%	-5.2%	-5.2%	-22.6%	-13.7%	8.4%	-19.4%	-19.0%
16	Garments & Leather	1.5%	1.4%	3.4%	7.0%	7.3%	6.3%	-15.1%	7.0%	8.1%	-12.0%	-16.3%
17	Wood Manufacturing	-28.1%	49.3%	10.2%	40.0%	-23.9%	-32.7%	-33.9%	-11.3%	-15.3%	30.0%	-29.8%
18	Paper & Paper Products	-2.1%	-3.3%	9.7%	-1.1%	-38.9%	-41.0%	13.9%	14.3%	-1.5%	-30.0%	5.9%
19	Chemical Manufcturing	6.4%	2.6%	0.7%	-4.1%	-4.3%	-9.7%	-20.5%	-14.8%	-16.4%	-29.6%	-8.7%
20	Petroleum Refining	-13.9%	-9.5%	-34.6%	-16.5%	-37.6%	-36.9%	0.0%	-34.9%	-25.0%	12.5%	-30.0%
21	Non-metal manufacturing	-6.9%	-8.9%	1.4%	-10.0%	0.7%	40.4%	-2.3%	30.0%	0.9%	-20.8%	29.1%
22	Metal Manufacturing	5.9%	4.5%	3.1%	1.6%	-0.3%	8.1%	-8.3%	-0.9%	30.0%	-9.9%	-3.5%
23	Electrical Equipment Manufacturing	0.9%	-1.0%	13.7%	-22.2%	-35.5%	12.9%	-22.5%	28.3%	-22.9%	27.6%	-14.1%
24	Transport & Other Machinery Manufacturing	0.9%	0.0%	-2.4%	-0.4%	-2.6%	-8.0%	-1.8%	-4.9%	-29.5%	-5.5%	-5.7%
25	Other Manufacturing	-7.5%	-13.1%	-6.1%	3.1%	-15.6%	-12.3%	-0.1%	-31.5%	29.4%	28.9%	2.0%
26	Construction	0.2%	-0.2%	-0.5%	0.4%	-0.2%	-6.7%	-2.9%	-2.7%	6.3%	-1.2%	29.2%
27	Electricity, Gas and Water	-3.2%	-0.5%	-25.6%	-17.2%	50.0%	-32.3%	26.1%	-30.3%	-30.0%	-30.0%	-15.3%
28	Financial Sector	-3.8%	9.1%	-2.4%	39.4%	21.2%	36.1%	30.2%	30.0%	10.9%	-7.1%	26.3%
29	Private Education	-1.2%	28.7%	-40.3%	-2.3%	50.0%	-15.4%	-27.1%	-33.4%	30.0%	30.0%	-29.4%
30	Private Health	14.2%	-19.3%	-5.3%	3.3%	44.5%	9.2%	33.2%	-35.0%	30.0%	-25.9%	27.8%
31	Public Education	-1.0%	-1.1%	-1.8%	-1.3%	-1.2%	5.8%	-4.4%	-0.6%	9.7%	-3.9%	-4.8%
32	Public Health	-1.7%	2.2%	-2.4%	-2.0%	-4.8%	-9.9%	0.8%	24.1%	-17.8%	-5.9%	-5.2%
33	General Government	0.6%	0.1%	1.1%	0.8%	1.2%	-0.7%	2.0%	4.9%	-8.4%	2.6%	-5.2%
34	Other Services	0.0%	0.0%	4.0%	-0.3%	-1.3%	-0.9%	-2.6%	-0.3%	0.7%	-1.2%	-1.9%

Table 8: Change in Protein and Calorie Availability in Households (scenario vs base)

PROTEIN AVAILABILITY

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
HH1	-0.0064	0.0127	-0.0020	0.0025	0.0177	-0.1314	-0.0080	0.0687	-0.0970	0.0271	-0.0187
HH2	-0.0041	0.0111	-0.0008	0.0035	0.0144	-0.0704	-0.0241	0.0648	-0.1004	0.0401	-0.0215
HH3	0.0002	0.0090	-0.0091	0.0173	0.0133	-0.0062	-0.0232	-0.0148	-0.0379	-0.0129	0.0571
HH4	-0.0002	0.0017	-0.0023	0.0587	0.0114	0.0284	-0.0341	-0.0464	-0.0059	-0.0152	0.1027
HH5	0.0006	-0.0024	0.0032	0.0930	0.0190	0.0959	-0.0303	-0.0869	0.0180	0.0289	0.1111

Period Totals

1990-1995	1990-1994	1995-1996	1996-2000	1990-2000
-0.1067	0.0246	-0.1394	-0.0278	-0.1345
-0.0462	0.0242	-0.0945	-0.0411	-0.0873
0.0245	0.0306	-0.0294	-0.0317	-0.0072
0.0976	0.0693	-0.0057	0.0011	0.0987
0.2092	0.1133	0.0656	0.0407	0.2499

CALORIE AVAILABILITY

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
HH1	-0.0042	0.0207	-0.0215	0.0515	0.0219	-0.0631	-0.0484	-0.0126	-0.0539	-0.0697	0.1698
HH2	-0.0006	0.0199	-0.0213	0.0522	0.0289	-0.0038	-0.0663	-0.0247	-0.0534	-0.0583	0.1624
HH3	0.0092	0.0165	-0.0354	0.0582	0.0474	0.0399	-0.0685	-0.1012	0.0092	-0.1354	0.2433
HH4	0.0065	0.0127	-0.0240	0.0834	0.0513	0.0502	-0.0689	-0.1324	0.0351	-0.1162	0.2418
HH5	-0.0029	0.0239	-0.0153	0.0994	0.0408	0.1342	-0.0675	-0.2062	0.0605	-0.0572	0.2307

1990-1995	1990-1994	1995-1996	1996-2000	1990-2000
0.0055	0.0685	-0.1114	-0.0147	-0.0093
0.0753	0.0791	-0.0701	-0.0404	0.0349
0.1358	0.0959	-0.0286	-0.0526	0.0832
0.1801	0.1299	-0.0186	-0.0405	0.1396
0.2800	0.1458	0.0668	-0.0397	0.2404

Summary results of Economy-Wide Model runs involving implicit tariff changes from 1988 to 2000 (base run: 1988)

Table 9: Output Price Effects, major sectors

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Agriculture	3.53%	-2.54%	-1.29%	-3.32%	5.22%	17.29%	21.25%	-4.33%	5.17%	5.32%	0.61%
Mining	10.20%	4.00%	0.30%	0.80%	-1.20%	-0.30%	-8.40%	10.80%	8.20%	2.60%	13.70%
Total Mfg	-1.58%	-0.06%	-0.02%	-0.54%	-5.71%	-4.58%	-7.14%	1.42%	-3.29%	0.75%	-4.16%
Mfg - food	-0.57%	0.32%	2.68%	4.99%	7.05%	-4.98%	-0.38%	10.77%	-2.24%	6.35%	4.76%
Mfg - others	-2.13%	-0.27%	-1.51%	-3.58%	-12.71%	-4.37%	-10.84%	-3.72%	-3.86%	-2.33%	-9.05%
Construction	0.20%	-0.20%	-0.50%	0.40%	-0.20%	-6.70%	-2.90%	-2.70%	6.30%	-1.20%	29.20%
Utilities	-3.20%	-0.50%	-25.60%	-17.20%	50.00%	-32.30%	26.10%	-30.30%	-30.00%	-30.00%	-15.30%
Services	0.69%	3.61%	-7.57%	5.42%	15.60%	2.25%	4.52%	1.06%	6.25%	-1.85%	0.76%

Period Totals

1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
18.89%	1.60%	38.54%	28.01%	46.91%
13.80%	14.10%	-8.70%	26.90%	40.70%
-12.49%	-7.91%	-11.72%	-12.42%	-24.91%
9.49%	14.47%	-5.36%	19.26%	28.75%
-24.57%	-20.20%	-15.21%	-29.81%	-54.38%
-7.00%	-0.30%	-9.60%	28.70%	21.70%
-28.80%	3.50%	-6.20%	-79.50%	-108.30%
20.00%	17.75%	6.77%	10.74%	30.74%

Summary results of Economy-Wide Model runs involving implicit tariff changes from 1988 to 2000
(base run: 1988)

Table 7:

Changes in sectoral output (scenario vs base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Agriculture	-0.92%	-0.06%	-0.83%	-1.65%	-3.17%	-10.19%	-5.30%	2.51%	-3.78%	0.17%	-0.71%
Mining	0.27%	0.19%	1.43%	1.36%	2.21%	3.78%	0.91%	1.89%	2.35%	2.21%	-1.35%
Total Mfg	0.51%	0.19%	-1.16%	1.54%	1.78%	2.09%	3.90%	-1.01%	6.36%	0.21%	4.60%
Mfg - food	0.85%	0.03%	-2.51%	0.95%	-2.11%	2.08%	4.21%	-3.89%	6.32%	-2.07%	8.15%
Mfg - others	0.27%	0.30%	-0.21%	1.95%	4.50%	2.10%	3.69%	1.00%	6.38%	1.80%	2.12%
Construction	0.05%	0.01%	-0.06%	-0.07%	-0.15%	6.23%	-1.11%	2.06%	-4.04%	0.10%	-22.32%
Utilities	0.89%	0.10%	9.00%	6.05%	-6.25%	12.98%	-2.79%	9.88%	12.39%	10.87%	7.12%
Services	0.16%	0.02%	-1.66%	0.27%	0.85%	1.27%	2.22%	0.45%	1.25%	1.20%	2.87%

Period totals

	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	-16.83%	-6.64%	-15.49%	-7.11%	-23.93%
Mining	9.25%	5.47%	4.69%	6.01%	15.26%
Total Mfg	4.96%	2.87%	6.00%	14.06%	19.02%
Mfg - food	-0.70%	-2.78%	6.29%	12.72%	12.02%
Mfg - others	8.91%	6.81%	5.79%	14.99%	23.91%
Construction	6.00%	-0.23%	5.11%	-25.31%	-19.31%
Utilities	22.77%	9.80%	10.19%	37.48%	60.25%
Services	0.91%	-0.37%	3.50%	7.99%	8.90%

Changes in sectoral labor demand (scenario vs base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Agriculture	-0.01%	0.08%	0.04%	1.19%	2.09%	-1.06%	0.78%	-3.18%	0.87%	-1.88%	0.48%
Mining	0.25%	0.86%	2.18%	2.04%	4.95%	5.47%	2.29%	-4.17%	1.56%	-0.90%	-8.41%
Total Mfg	0.82%	1.31%	-2.39%	3.82%	6.11%	1.79%	5.87%	-4.43%	7.78%	1.41%	9.80%
Mfg - food	0.88%	2.35%	-1.58%	4.88%	4.01%	6.14%	6.08%	-6.52%	10.71%	0.37%	14.42%
Mfg - others	0.74%	0.16%	-3.29%	2.65%	8.45%	-3.04%	5.64%	-2.11%	4.51%	2.58%	4.65%
Construction	0.05%	0.68%	-0.79%	0.27%	1.01%	5.10%	-1.73%	3.66%	-4.22%	1.24%	-21.38%
Utilities	1.01%	0.80%	8.37%	6.48%	-5.01%	13.10%	-2.78%	11.07%	12.92%	12.11%	8.29%
Services	-0.04%	0.85%	-2.60%	0.47%	1.88%	-4.02%	-0.65%	5.30%	-1.15%	3.10%	5.88%

	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	2.32%	3.38%	-0.28%	-2.92%	-0.60%
Mining	15.74%	10.28%	7.76%	-9.63%	6.12%
Total Mfg	11.47%	9.67%	7.66%	20.43%	31.90%
Mfg - food	16.67%	10.53%	12.21%	25.05%	41.72%
Mfg - others	5.68%	8.72%	2.59%	15.28%	20.95%
Construction	6.32%	1.22%	3.38%	-22.42%	-16.10%
Utilities	24.75%	11.65%	10.33%	41.61%	66.37%
Services	-3.46%	0.56%	-4.67%	12.48%	9.02%

Changes in sectoral capital factor demand (scenario vs base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Agriculture	-1.33%	0.43%	1.04%	3.79%	3.70%	-12.88%	-10.07%	4.24%	-4.70%	6.60%	2.39%
Mining	0.00%	-0.65%	3.45%	1.17%	2.03%	5.21%	2.26%	-6.36%	0.54%	-3.24%	-10.51%
Total Mfg	0.23%	0.95%	0.19%	3.36%	1.63%	4.99%	5.91%	-5.89%	5.68%	-1.56%	8.77%
Mfg - food	0.15%	1.30%	-0.15%	3.89%	1.40%	5.34%	6.65%	-8.20%	6.28%	-3.22%	10.79%
Mfg - others	0.56%	-0.45%	1.53%	1.22%	2.54%	3.63%	2.97%	3.34%	3.31%	5.05%	0.69%
Construction	-0.19%	-0.82%	0.45%	-0.59%	-1.80%	4.85%	-1.75%	1.29%	-5.18%	-1.15%	-23.18%
Utilities	0.76%	-0.70%	9.73%	5.57%	-7.65%	12.83%	-2.80%	8.53%	11.79%	9.47%	5.80%
Services	-0.25%	-0.44%	-2.23%	-0.55%	-0.57%	-4.45%	-1.20%	2.00%	-1.75%	0.92%	2.74%

	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	-5.26%	7.62%	-22.95%	-1.53%	-6.80%
Mining	11.22%	6.01%	7.47%	-17.31%	-6.08%
Total Mfg	11.35%	6.36%	10.91%	12.92%	24.27%
Mfg - food	11.93%	6.60%	11.99%	12.31%	24.24%
Mfg - others	9.03%	5.40%	6.60%	15.36%	24.39%
Construction	1.90%	-2.95%	3.10%	-29.97%	-28.07%
Utilities	20.54%	7.71%	10.03%	32.79%	53.33%
Services	-8.49%	-4.04%	-5.64%	2.70%	-5.79%

Changes in sectoral mixed factor demand (scenario vs base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Agriculture	-0.86%	-0.12%	-1.04%	-0.87%	-1.38%	-11.22%	-6.85%	2.48%	-5.22%	-2.60%	-0.88%
Mining	0.97%	-0.53%	5.03%	1.67%	3.26%	17.12%	8.33%	-10.55%	6.62%	-3.64%	-11.78%
Total Mfg	1.70%	-1.47%	-0.61%	1.78%	3.56%	11.93%	8.93%	-7.11%	5.24%	-2.38%	7.04%
Mfg - food	0.96%	-1.02%	-0.78%	4.51%	5.34%	14.63%	7.09%	-7.44%	7.92%	-4.32%	8.30%
Mfg - others	3.10%	-2.30%	-0.29%	-3.36%	0.21%	6.84%	12.39%	-6.48%	0.21%	1.28%	4.68%
Construction	0.77%	-0.70%	1.98%	-0.10%	-0.62%	16.72%	4.08%	-3.24%	0.56%	-1.55%	-24.27%
Utilities											
Services	0.59%	-0.16%	-0.98%	0.38%	0.92%	6.19%	4.83%	-1.91%	3.93%	0.59%	1.81%

	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	-15.48%	-4.27%	-18.06%	-13.06%	-28.55%
Mining	27.51%	10.39%	25.46%	-11.01%	16.50%
Total Mfg	16.90%	4.97%	20.85%	11.73%	28.62%
Mfg - food	23.64%	9.02%	21.72%	11.54%	35.18%
Mfg - others	4.19%	-2.65%	19.23%	12.08%	16.27%
Construction	18.06%	1.34%	20.80%	-24.42%	-6.37%
Utilities	0.00%	0.00%	0.00%	0.00%	0.00%
Services	6.94%	0.75%	11.01%	9.24%	16.17%

Summary results of Economy-Wide Model runs involving implicit tariff changes from 1988 to 2000 (base run: 1988)

Table 6. Resource allocation effects

I. Resource allocation effects (percent difference in sectoral output share between scenario and base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	-1.07%	-0.10%	-0.29%	-2.21%	-3.40%	-12.10%	-6.24%	-6.24%	1.19%	-1.24%	0.67%	-19.17%	-7.07%	-18.34%	-11.85%	-31.02%
Mining	0.13%	0.15%	1.99%	0.78%	1.97%	1.57%	-0.09%	-0.09%	0.58%	0.77%	0.02%	6.59%	5.02%	1.48%	1.19%	7.78%
Total Mfg	0.36%	0.15%	-0.61%	0.96%	1.54%	-0.08%	2.88%	2.88%	-2.28%	-1.21%	6.05%	2.32%	2.40%	2.79%	8.32%	10.64%
Mfg - food	0.71%	-0.01%	-1.98%	0.38%	-2.34%	-0.09%	3.18%	3.18%	-5.12%	-3.46%	9.65%	-3.33%	-3.24%	3.09%	7.44%	4.11%
Mfg - others	0.12%	0.26%	0.34%	1.37%	4.25%	-0.08%	2.66%	2.66%	-0.29%	0.36%	3.54%	6.27%	6.35%	2.59%	8.94%	15.21%
Construction	-0.10%	-0.04%	0.49%	-0.64%	-0.39%	3.96%	-2.09%	-2.09%	0.76%	-1.31%	-21.24%	3.29%	-0.67%	1.87%	-25.98%	-22.68%
Utilities	0.75%	0.06%	9.60%	5.45%	-6.48%	10.57%	-3.75%	-3.75%	8.47%	9.31%	8.61%	19.95%	9.38%	6.82%	18.90%	38.85%
Services	0.01%	-0.02%	-1.12%	-0.30%	0.60%	-0.88%	1.21%	1.21%	-0.84%	-0.23%	4.30%	-1.71%	-0.83%	0.33%	5.67%	3.96%

II. Resource allocation effects (percent difference in sectoral labor factor demand share between scenario and base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	-0.11%	-0.66%	0.91%	0.19%	0.49%	-2.27%	1.39%	1.39%	-6.38%	-4.02%	5.76%	-1.47%	0.80%	-0.88%	-1.86%	-3.33%
Mining	0.15%	0.10%	3.07%	1.03%	3.31%	4.18%	2.90%	2.90%	-7.34%	-3.07%	-3.59%	11.83%	7.65%	7.08%	-8.19%	3.64%
Total Mfg	0.71%	0.56%	-1.54%	2.80%	4.44%	0.55%	6.50%	6.50%	-7.59%	-0.80%	15.56%	7.52%	6.97%	7.05%	20.18%	27.70%
Mfg - food	0.78%	1.59%	-0.73%	3.84%	2.37%	4.84%	6.71%	6.71%	-9.61%	-1.83%	20.43%	12.69%	7.85%	11.55%	22.42%	35.11%
Mfg - others	0.64%	-0.59%	-2.45%	1.64%	6.75%	-4.23%	6.27%	6.27%	-5.34%	0.34%	10.15%	1.76%	5.99%	2.04%	17.69%	19.45%
Construction	-0.05%	-0.07%	0.08%	-0.73%	-0.58%	3.82%	-1.14%	-1.14%	0.23%	-0.97%	-17.25%	2.47%	-1.35%	2.68%	-20.26%	-17.79%
Utilities	0.90%	0.05%	9.31%	5.42%	-6.50%	11.72%	-2.19%	-2.19%	7.39%	9.66%	13.98%	20.91%	9.19%	9.53%	26.65%	47.57%
Services	-0.15%	0.09%	-1.75%	-0.52%	0.28%	-5.19%	-0.06%	-0.06%	1.82%	0.85%	11.44%	-7.24%	-2.05%	-5.25%	14.00%	6.76%

III. Resource allocation effects (percent difference in sectoral capital factor demand share between scenario and base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	-1.14%	0.77%	1.45%	3.30%	4.21%	-12.26%	-9.22%	-9.22%	3.27%	5.88%	5.18%	-3.67%	8.58%	-21.47%	-4.11%	-7.78%
Mining	0.20%	-0.31%	3.87%	0.69%	2.54%	5.96%	3.23%	3.23%	-7.23%	-3.90%	-8.07%	12.95%	6.99%	9.20%	-12.73%	0.22%
Total Mfg	0.43%	1.29%	0.60%	2.87%	2.13%	5.75%	6.92%	6.92%	-6.77%	-2.23%	11.73%	13.06%	7.31%	12.66%	16.57%	29.63%
Mfg - food	0.34%	1.64%	0.26%	3.40%	1.91%	6.09%	7.66%	7.66%	-9.06%	-3.87%	13.81%	13.64%	7.55%	13.75%	16.21%	29.85%
Mfg - others	0.76%	-0.11%	1.94%	0.74%	3.05%	4.37%	3.94%	3.94%	2.37%	4.34%	3.43%	10.74%	6.37%	8.32%	18.04%	28.78%
Construction	0.00%	-0.48%	0.86%	-1.06%	-1.32%	5.60%	-0.82%	-0.82%	0.35%	-1.81%	-21.09%	3.60%	-2.00%	4.78%	-24.20%	-20.60%
Utilities	0.96%	-0.36%	10.17%	5.07%	-7.19%	13.64%	-1.88%	-1.88%	7.52%	8.73%	8.68%	22.28%	8.64%	11.76%	21.18%	43.46%
Services	-0.06%	-0.10%	-1.84%	-1.02%	-0.08%	-3.76%	-0.26%	-0.26%	1.05%	0.23%	5.54%	-6.86%	-3.10%	-4.02%	6.29%	-0.57%

IV. Resource allocation effects (percent difference in sectoral mixed factor demand share between scenario and base)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1990 - 1995	1990 - 1994	1995 - 1996	1996 - 2000	1990 - 2000
Agriculture	-1.22%	0.08%	-0.20%	-1.04%	-1.88%	-14.26%	-9.35%	-9.35%	3.85%	-2.44%	-1.32%	-18.51%	-4.25%	-23.61%	-18.62%	-37.13%
Mining	0.60%	-0.32%	5.93%	1.49%	2.73%	13.11%	5.42%	5.42%	-9.35%	-3.48%	-12.17%	23.54%	10.43%	18.53%	-14.17%	9.36%
Total Mfg	1.33%	-1.26%	0.24%	1.60%	3.03%	8.09%	6.00%	6.00%	-5.87%	-2.22%	6.56%	13.04%	4.95%	14.09%	10.47%	23.51%
Mfg - food	0.60%	-0.82%	0.07%	4.33%	4.80%	10.70%	4.21%	4.21%	-6.21%	-4.16%	7.81%	19.68%	8.99%	14.91%	5.85%	25.54%
Mfg - others	2.73%	-2.10%	0.56%	-3.53%	-0.30%	3.18%	9.37%	9.37%	-5.23%	1.44%	4.21%	0.53%	-2.65%	12.55%	19.16%	19.69%
Construction	0.41%	-0.50%	2.86%	-0.27%	-1.13%	12.72%	1.28%	1.28%	-1.95%	-1.39%	-24.61%	14.09%	1.37%	14.00%	-25.39%	-11.29%
Utilities												0.00%	0.00%	0.00%	0.00%	0.00%
Services	0.23%	0.04%	-0.14%	0.21%	0.40%	2.55%	2.00%	2.00%	-0.60%	0.75%	1.35%	3.30%	0.75%	4.55%	5.51%	8.81%

C I R D A P

The Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) is a regional, inter-governmental, autonomous institution, established in July 1979 at the initiative of the countries of the Asia-Pacific Region and the Food and Agriculture Organization (FAO) of the United Nations with support from several other UN bodies and donors. Its member countries include Afghanistan, Bangladesh (Host State), India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand and Vietnam.

The main objectives of CIRDAP are to (i) assist national action; (ii) promote regional cooperation, and (iii) act as a servicing institution for its member countries for promotion of integrated rural development through research, action research, pilot project, training and information dissemination. Amelioration of rural poverty in the Asia-Pacific region has been the prime concern of CIRDAP. The Centre is committed to the WCARRD Follow-up Programmes. The programme priorities of CIRDAP are set under four areas of concern: (1) agrarian development; (2) institutional/ infrastructural development; (3) resource development including human resources; and (4) employment.

Operating through designated Contact Ministries and Link Institutions in member countries, CIRDAP promotes technical cooperation among nations of the region. It plays a supplementary and reinforcing role in supporting and furthering the effectiveness of integrated rural development programmes in the Asia-Pacific region.